American Foundryman

THE FOUNDRYMEN'S OWN MAGAZINE

July 1953

Honestly, sand preparation and control needn't be as complicated as some people make out it is. True, you've got to be sure carbon content is right—that green and dry strengths are high enough—that flowability is just as required. But this can be accomplished easily and economically through the use of three highly efficient and inexpensive sand additives. By using these materials in varying amounts, sand characteristics can be controlled and changed to satisfy specific requirements.

Carbon content is controlled by adding CROWN HILL SEACOAL. Green and dry strengths are varied through the addition of FEDERAL GREEN BOND. Flowability is provided by adding FEDERAL SAND STABILIZER.

There are other advantages, too! You can use common lake, river or beach sand for heap or system replacement. So, there's no danger of sand grain size being thrown out of balance—as happens when offals of cores made of coarse sand, mix in with the fines necessarily used with emulsified asphalt or resin additives. And most important of all—*these three additives will cost you less than $1.00 per ton of castings produced!*

Write today for your copy of new bulletin describing this *better* method of sand preparation and control.

CROWN HILL SEACOAL

Produced by *Federal* at Crown Hill, West Virginia. *High* in volatile combustible material, low in sulphur and ash content—basic requirements for a top quality seacoal. Ground or granulated to properly match the sand used.

FEDERAL GREEN BOND

Mined, processed and guaranteed by *Federal*. Unexcelled in uniformity and ability to develop green and dry strength. Possesses many times the natural bonding power of any other sand bond. Truly the best of the bentonites!

FEDERAL SAND STABILIZER

A processed cellulose sand additive whose high combustibility allows sand to expand evenly to eliminate casting defects. It increases sand flowability to provide better ramming conditions and attracts moisture to broaden the safe moisture range.

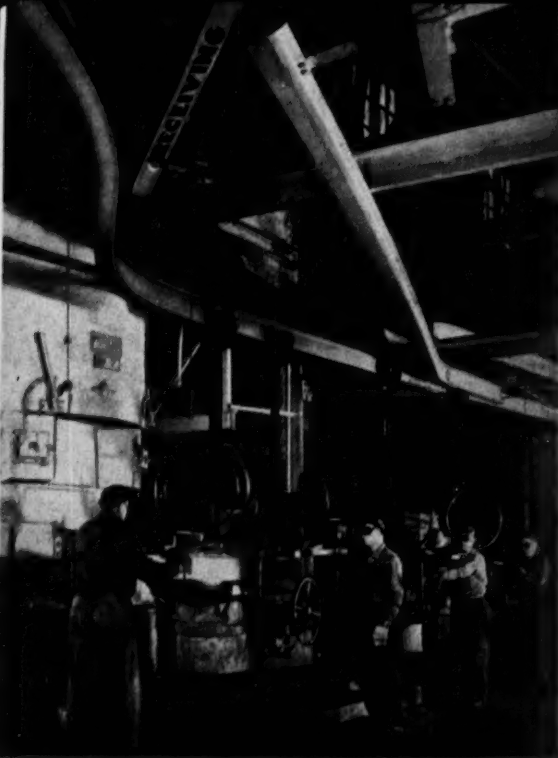
IMPORTANT . . . Federal Sand Stabilizer also holds lumpy shakeout to an absolute minimum!

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CROWN HILL W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON WYO.



Curved, monorail loops — with turntables, transfer and tongue switches — can be designed to serve the most congested areas at cupolas.

Long spans of distributing monorail, like that shown below, have [illegible]

STEADY DOES IT!

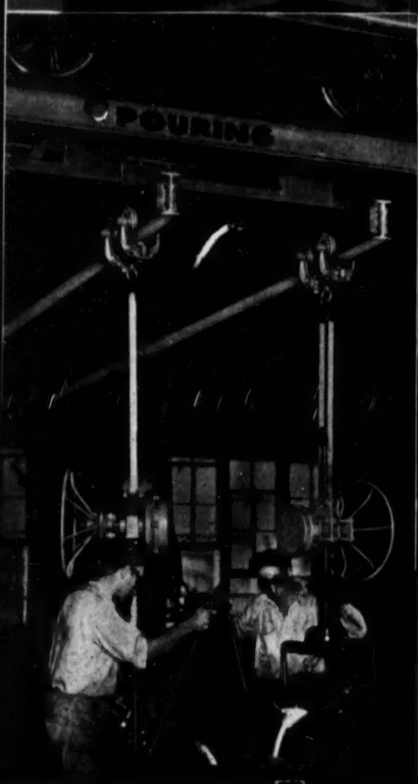
MODERN SPEED AND SAFETY
FROM CUPOLA SPOUT TO SPRUE HOLE . . .

Engineering a co-ordinated system for the over-head RECEIVING . . . DISTRIBUTING and POURING of hot metal is highly specialized business: Much Foundry "Know-How" must go into the planning to move metals fast, yet SAFELY, too! Working together as a unit MODERN ladles . . . pouring devices . . . trolleys . . . hoists and cranes deliver their top tonnages through a rigid, hard-working track.

MODERN, rigid, I-beam, monorail sections — complete with switches and cross-overs — are bolted to roof trusses to meet the toughest of all service—FOUNDRY SERVICE!

Further completing the effectiveness of MODERN, over-head, hot-metal handling systems are dependable crane locks to link-in the distributing monorail with pouring cranes.

Shown here are three of these over-head crane and monorail combinations. Many more are covered in catalog 150. You can use the coupon. Or, if you have an immediate, over-head, handling problem plan now to write it up for the attention of a MODERN, layout engineer. There's no charge for this preliminary planning . . .



Teapot pouring from model "P" Pouring Devices and covered ladles of 300 lbs. capacity. The MODERN crane is an adjustable, double-beam type to serve a wide range of sprue-hole centers.

MODERN

MODERN EQUIPMENT COMPANY
DEPT. A-7, **PORT WASHINGTON, WISCONSIN**

MAIL TO MY ATTENTION:

Catalog #150 on cranes and monorail .... ☐
Catalog #147 on metal pouring systems .... ☐
Catalog #149, standard ladles .... ☐
Catalog #147-A, cupolas and chargers .... ☐
MORE INFORMATION ON FREE-LOAN OF MODERN, SOUND, COLOR, 16mm FILMS .... ☐

COMPANY ....

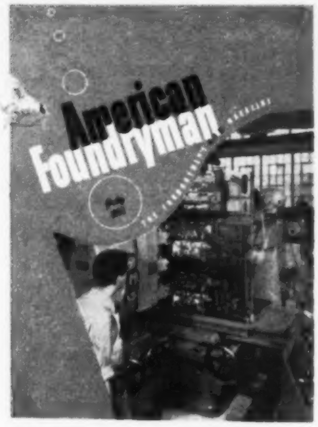
STREET ....

CITY ....

ATTENTION .... STATE ....

MODERN REPRESENTATIVES IN ALL PARTS OF THE WORLD

American Foundryman



A duplicating machine follows contours of the precision pattern at the top, reproducing the two copies in the center of the photo. Skill in producing accurate, multiple pattern equipment for automotive and aircraft use is characteristic of operations at City Pattern Foundry & Machine Co., Detroit (pages 36-39).

Volume 24 **July 1953** *Number 1*

Published by American Foundrymen's Society

In This Issue . . . .

Departments . . . .

Publications Committee

H. J. Rowe, *Chairman*
Aluminum Co. of America, Pittsburgh
Harry W. Dietert
Harry W. Dietert Co., Detroit
C. H. Lorig,
Battelle Memorial Institute
W. D. McMillan
International Harvester Co., Chicago
H. M. St. John
Crane Co., Chicago
F. J. Walls
International Nickel Co., Detroit

A.F.S. Headquarters

616 S. Michigan, Chicago 5
Wm. W. Maloney
Secretary-Treasurer
H. J. Heine
Assistant Technical Director

American Foundryman

Wm. W. Maloney, *Editor*
H. F. Scobie, *Technical Editor*
H. J. Wheelock, *Managing Editor*
G. J. Minogue, *Production*
W. N. Davis, *Safety & Hygiene & Air Pollution Editor*
J. E. Foster, *Transactions Editor*
Terry Koeller, *Advertising Manager*

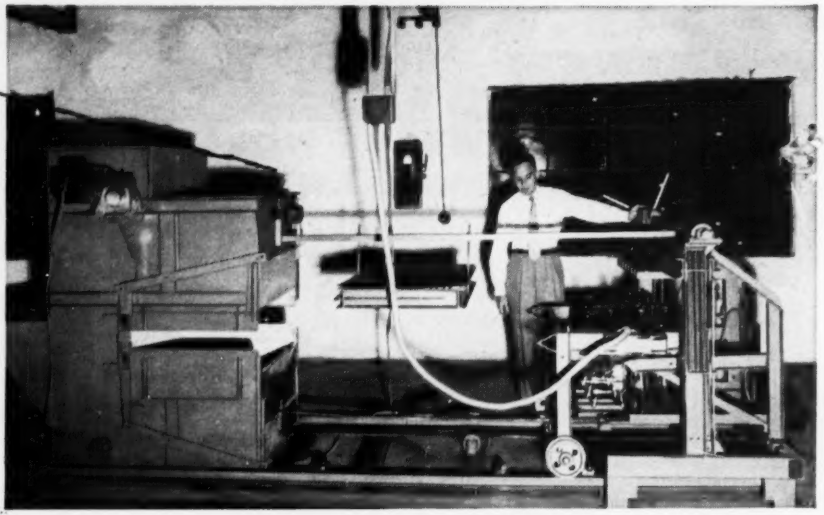
Advertising Representatives

MIDWESTERN—Dwight Early & Sons
100 N. LaSalle St., Chicago
CEntral 6-2184
CENTRAL—R. E. Cleary, *Commercial & Savings Bank Bldg., Berea, Ohio*
Berea 4-7719
EASTERN—Robert B. Weston,
6 E. 39th St., New York
Murray Hill 5-9450

AUDITED PAID CIRCULATION ABC

Published monthly by the American Foundrymen's Society, Inc., 616 S. Michigan Ave., Chicago 5. Subscription price in the U.S., Canada and Mexico $5.00 per year; elsewhere, $6.00. Single copies 50c. Entered as Second Class Matter, July 22, 1938, under Act of March 3, 1879, at the Post Office, Chicago.

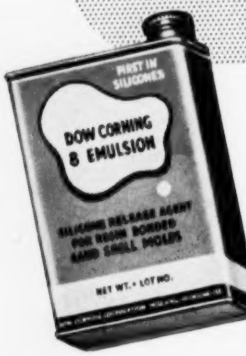
STEP UP SHELL MOLDING DEPENDABILITY



President C. E. Kohlhase of the Southern Shell Mold Equipment Co., Chattanooga, Tennessee, at the carrier control of their new semi-automatic machine. Especially adapted to both experimental and production work, the machine mounts an integrally heated pattern on a rolling platform. The pattern is coated with sand resin mix in the investment chamber at left. Excess mix is returned to the upper hopper by an automatic conveyor. After a curing period under the electric radiant heater, center, the platform rolls to a manual shell ejector, right. The pattern is flipped over and the shell removed. Parting agent is sprayed on automatically, the pattern is righted, and the platform returns to its starting position for another cycle. Capacity ranges up to sixty 20" x 30" x 7" shells per hour.

with DOW CORNING 8 EMULSION

... the NEW Silicone Parting Agent that helps assure Fast, Continuous Production of Shell Molds and Cores at Low Cost.



Easy release is the key to maximum production of more dependably accurate shell molds at minimum cost. And that's just what you get when you use the new Dow Corning 8 Emulsion.

Especially designed for the shell process, Dow Corning 8 Emulsion costs less, goes further and gives positive release from even the most complex patterns. More effective at lower concentrations than any previous material, it gives you even less build-up on pattern surfaces. Dimensional accuracy is retained through longer runs; pattern-cleaning costs are substantially reduced; "stickers" can be completely eliminated.

Easily diluted with hard or soft water, Dow Corning 8 Emulsion is nonflammable, noncorrosive and highly resistant to creaming or separating in storage or after dilution. And it is available at a new low price, 8% below that of previous emulsions. For more information and a free trial sample, fill in and mail this coupon today.

Send for sample TODAY

DOW CORNING CORPORATION, Dept. AV-7
Midland, Mich.

Please send me
- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ Data on Silicone Release Agents for the Shell Process

Name ____________________

Company ____________________

Street ____________________

City ____________ Zone ____ State ____________

DOW CORNING DOW CORNING SILICONES **CORPORATION**
MIDLAND MICHIGAN

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C. (Silver Spring, Md.)
In Canada: Fiberglas Canada Ltd., Toronto In Great Britain: Midland Silicones Ltd., London

Looks Good?

But LOOKS ARE OFTEN DECEIVING

The same applies to molten iron, too!

ONLY IRON IN THE BEST CONDITION CAN ENSURE YOU THE BEST CASTINGS

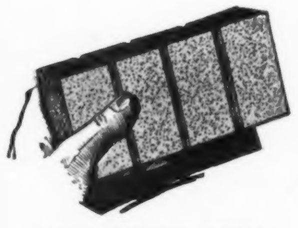
Famous Cornell Cupola Flux will prove to be the best friend your molten iron ever had. It removes all the impurities that are detrimental to its quality, makes iron hotter, increases its fluidity, greatly reduces sulphur and keeps slag fluid.

Iron thus cleansed ensures sounder, cleaner castings —minimum rejects.

Famous Cornell Cupola Flux also keeps cupolas cleaner—reduces down time and maintenance cost. The drops are cleaner, bridging over is practically eliminated. And a glazed or vitrified protective surface is formed on cupola lining, reducing erosion and repairs.

Pre-Measured Scored Brick Form enables you to flux a charge of iron in a few seconds and do an accurate job, besides avoiding waste.

WRITE FOR BULLETIN NO. 46-B



SCORED BRICK FORM

(Approx. 4 pound brick)

- **BE SURE YOUR IRON IS *RIGHT*...**

...use Famous

CORNELL

CUPOLA FLUX

whether you operate a gray iron foundry or malleable foundry with cupolas.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES

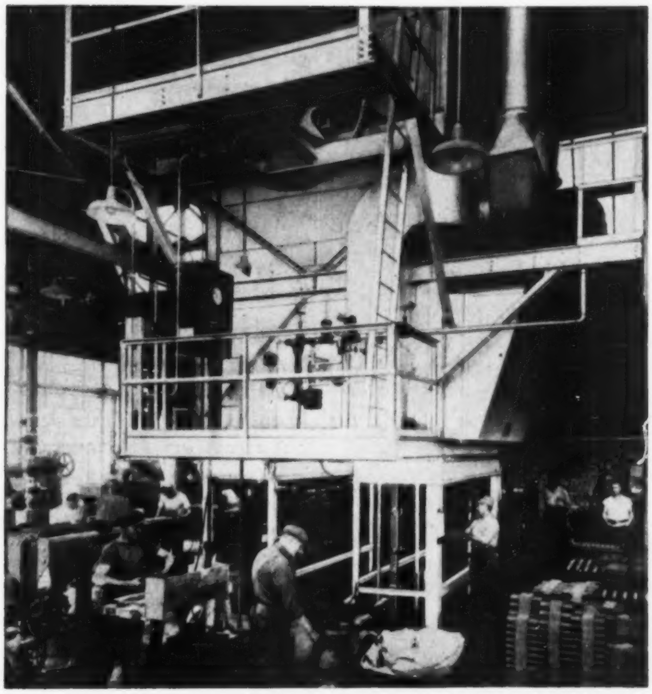
Trade Mark Registered

BRASS FLUX	**FAMOUS CORNELL BRASS FLUX** cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.
ALUMINUM FLUX	**FAMOUS CORNELL ALUMINUM FLUX** cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

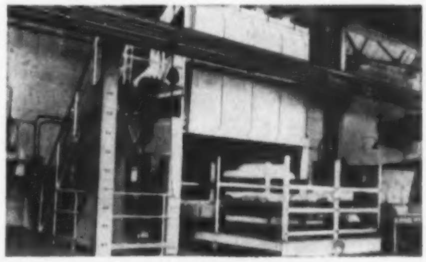
Repeat orders for

COLEMAN OVENS

prove outstanding performance



Coleman Tower Oven at Wells Manufacturing Co.



Coleman Car-Type Core Ovens at Pettibone-Mulliken Co.

Coleman Car-Type Mold Oven at The Bullard Co.

Battery of Coleman Transrack Core Ovens at The Crucible Steel Castings Co.

You should get all the facts concerning the core and mold ovens you expect to install . . . because the right ovens will increase your production and your profits. Over 80% of Coleman Ovens are "repeat orders" from past customers . . . proving performance to *complete satisfaction.* Coleman Ovens are the choice of leading firms in every branch of the foundry industry from small shops to large production foundries. You get over 50 years of know-how and experience in every Coleman Oven, so why gamble with inferior designs? Coleman Ovens of proved performance cost no more . . . and pay for themselves quickly out of savings in fuel, labor and increased production. Get the facts today . . .

WRITE FOR BULLETIN C

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

- Tower Ovens
- Horizontal Conveyor Ovens
- Car-Type Ovens
- Transrack Ovens
- Rolling Drawer Ovens
- Portable Core Ovens
- Portable Mold Dryers

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD CLEVELAND 13, OHIO

● ***world's oldest and largest foundry oven specialists***

MEMBER FEMA

Here's How...

• • • Grede Foundries, Reedsburg, Wis., uses a Caterpillar D7 tractor with No. 7A Bulldozer to handle its slag problem. The unit is also used to maintain the roads and ditches near the foundry. Henry Thieding, who contracts the equipment, says: "I find it is one of the nicest machines to operate that I've owned."

For more data, circle No. 1 on card, page 17

• • • one of the country's largest aluminum foundries is now using Heli-arc welding to correct imperfect castings. The castings, some of which are for vital defense production, must pass rigid quality inspections. The foundry uses a special line for this reclamation work. The only preparation usually required is grinding, although preheating is used if the area to be welded is particularly large. Special rods, cast by the foundry, are used in the operation. Every weld is x-ray tested before the casting is released for assembly.

For more data, circle No. 2 on card, page 17

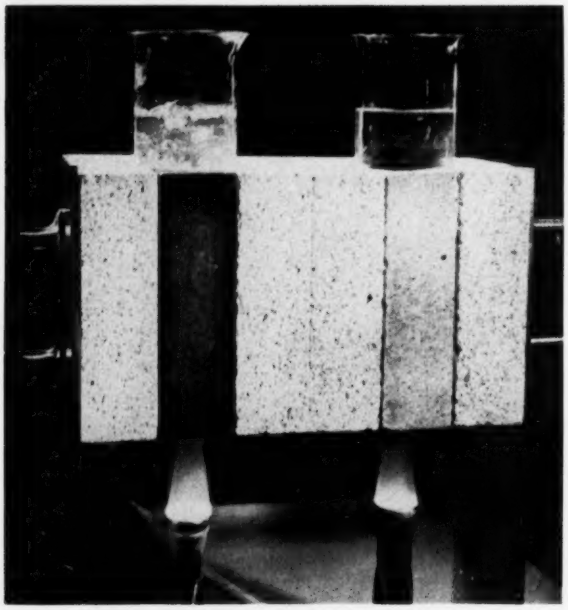
• • • Precision Castings Co., Hamilton, Ohio, is getting greater tool economy through the use of friction sawing. Use of revolving fixture expedites operation in which foundry says improved friction blade shows 18-20% life increase.

For more data, circle No. 3 on card, page 17

Products & Processes

For additional information,

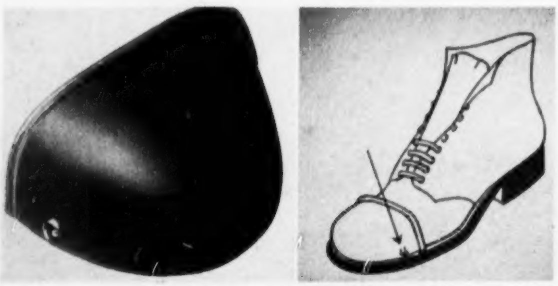
use postcard at bottom of page 17



Heat-Conducting Brick

Unusual heat transfer qualities claimed for Carbofrax silicon carbide brick (left) is illustrated above. Water in beaker over fireclay brick (right) is barely tepid, while beaker on Carbofrax brick boils furiously. Manufacturer says product is inherently resistant to abrasion, spalling and cracking and furnace atmospheres, has a crushing strength of over 10,000 psi at 2460 F, and is useful at temperatures up to 3000 F. *Carborundum Co.*

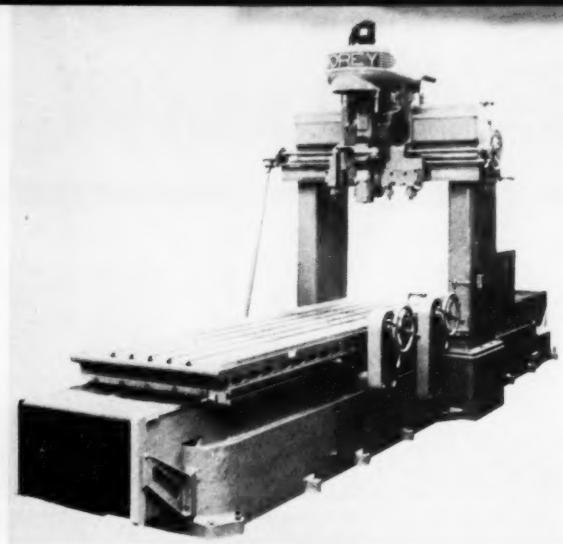
For more data, circle No. 4 on card, page 17



Safety Toe Clip

This Sta-Safe Toe Clip is a light-weight, detachable steel shell that fits over any regular working shoe, giving the worker protection against falling objects. A reinforced bead across top and down both sides to bottom of shoe gives added strength and resistance to impact. *Standard Safety Eqpt. Co.*

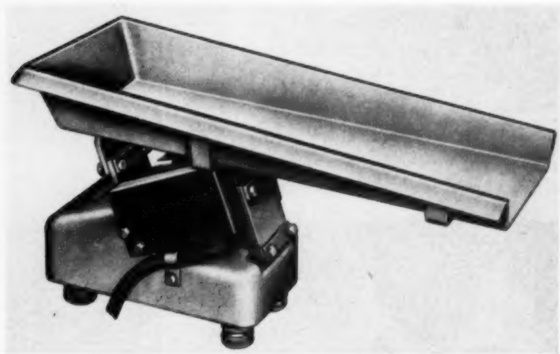
For more data, circle No. 5 on card, page 17



Profiler and Miller

Here is a profiler for milling and profiling large forgings and castings, as well as cast iron parts and steel forgings. Full support bed, 10-ft table. *Morey Mach. Co.*

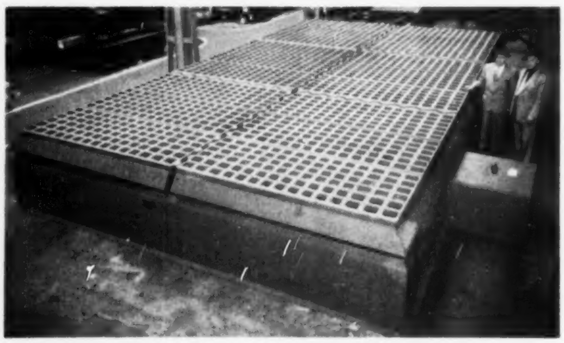
For more data, circle No. 6 on card, page 17



Electromagnetic Vibratory Feeder

This Model F-01 electromagnetic Vibratory Feeder is designed for low tonnage bulk materials handling and feeding. Inexpensive, replaceable parts. *Syntron Co.*

For more data, circle No. 7 on card, page 17



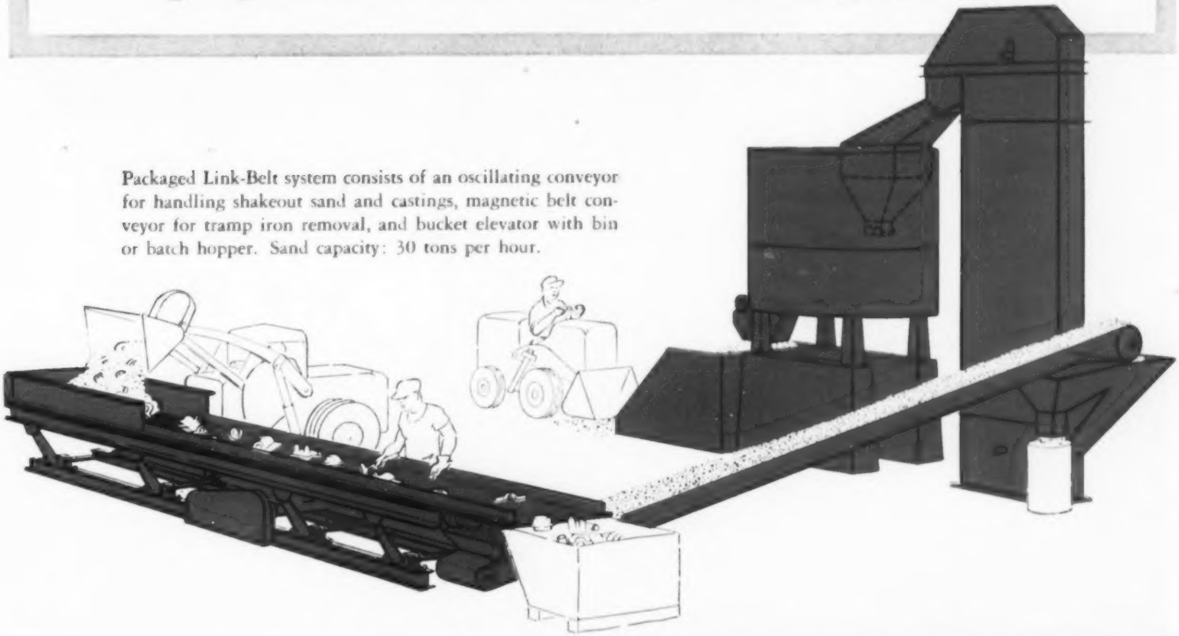
Improved Shakeout

Latest design features are incorporated in this 16 x 30 ft, 300,000 lb capacity Foundromatic shakeout. Write for information. *Allis-Chalmers Mfg. Co.*

For more data, circle No. 8 on card, page 17

Now small foundries cut costs

with pre-engineered, packaged sand preparation and casting handling system



Packaged Link-Belt system consists of an oscillating conveyor for handling shakeout sand and castings, magnetic belt conveyor for tramp iron removal, and bucket elevator with bin or batch hopper. Sand capacity: 30 tons per hour.

LINK-BELT combines ruggedness, compactness and low cost in a modern, mechanized unit

If you have less than 100 employees in your foundry, here's the ideal answer for increased output of better castings . . . at lower cost. Link-Belt has applied its broad experience in foundry handling problems to produce a compact, pre-engineered system that revolutionizes small foundry casting operations. It means "big foundry" organization and efficiency, regardless of the volume of your production.

Through modern sand control, this unit will quickly pay its way by reducing labor costs and improving casting quality. Equally important, systematic handling of sand and castings assures better working conditions and a cleaner foundry . . . eliminates wasted floor space.

Whether your foundry is large or small—gray iron, steel, malleable or non-ferrous—Link-Belt engineering and equipment fill the bill. A foundry specialist will be glad to work with you or your consultant. Your nearest Link-Belt office welcomes the opportunity to give you complete information.

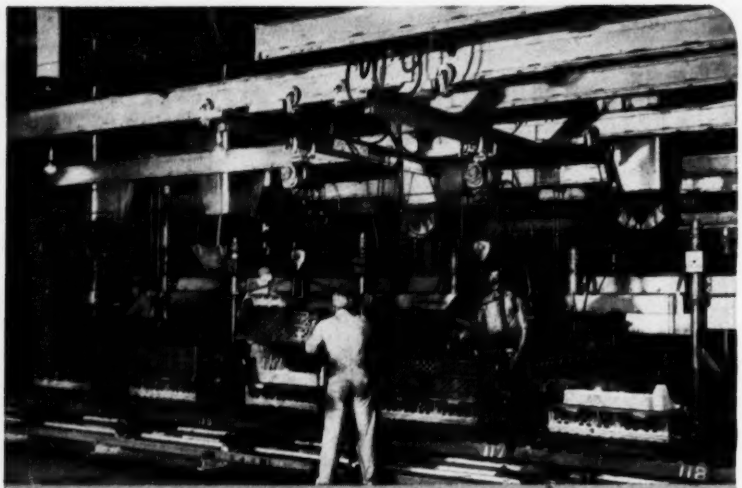
Link-Belt Oscillating Conveyor has perforated trough at feed end to act as shakeout section and plain section of trough for spruing and sorting of castings. Air cylinder operates damming gate between sections to hold back castings for proper shakeout action.

13,278

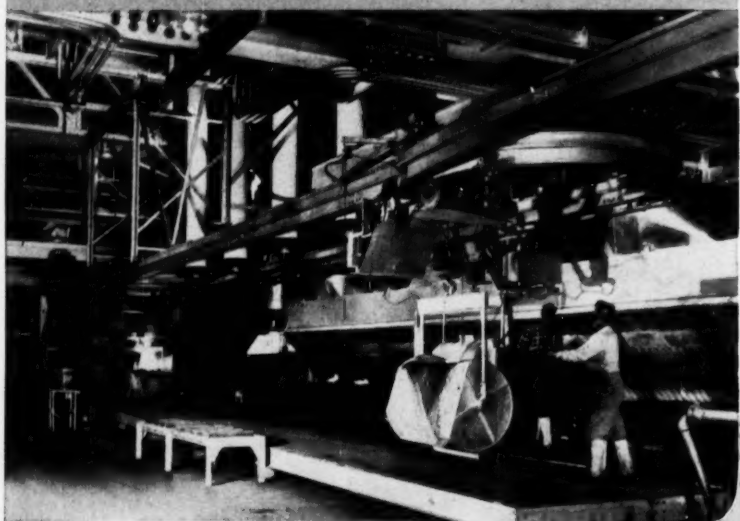
LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities.



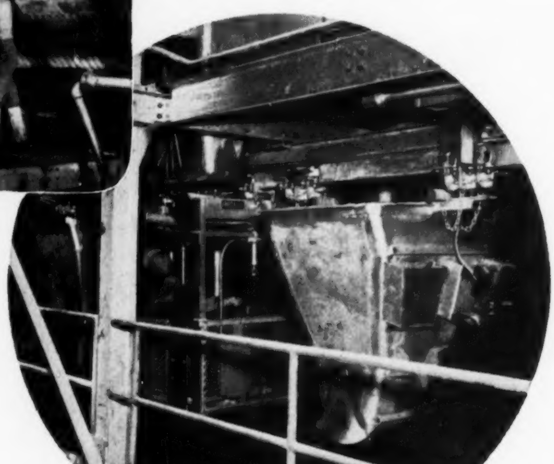
American MonoRail Cranes handle flasks through core setting to closing of cope and drag. 140 of these 1-ton cranes operate on 5800 feet of American MonoRail Girder Rail on the flask preparation line.



AMERICAN MONORAIL

Moves Core Sand, Flasks, Ladles in the NEW FORD FOUNDRY

At the pouring loops, ladles on American MonoRail carriers move at the same rate as the flasks for quick, easy pouring. 41 carriers operate on 1250 feet of Shielded Rail Master Track to complete this operation.



American MonoRail equipment in the new Ford Cleveland Foundry moves core sand from hoppers to core blowers by means of 3 cab operated carriers on a Shielded Rail Master MonoRail System which includes 950 feet of track and 10 motor operated 2-way glide switches.

Other systems, as illustrated, handle flasks and ladles over extensive American MonoRail Installations.

Experienced engineers will be glad to consult with you on any handling problems in your foundry. Write for the new "Case Study File" showing other applications.

THE AMERICAN MONORAIL COMPANY

13122 ATHENS AVENUE CLEVELAND 7, OHIO

Products & Processes

Fill out postcard below for complete information on products listed in these pages.

Continued from page 12

CONVENIENT FORM FOR ORDERING INFORMATION

New Sand Grades

Two new grades of sand are now being marketed, designed to better serve the needs of foundrymen through wider selection, according to the manufacturer. Uniform grain distribution through screening is said to be another feature of these grades. They are: blended coarse, with an AFS grain fineness of 43; and blended fine, with an AFS grain fineness of 52. Other grades are also available. *Nugent Sand Co.*

For more data, circle No. 9 on card.

Heavy-duty Plastic Glove

A new heavy-duty plastic coated work glove is said to outwear regular plastic as much as 2 to 1. The new coating, "Durox," is used exclusively on the new Grappler line. It is claimed to be tough-tempered, and long-wearing and closely resembles leather. Excellent wet-grip qualities make the glove outstanding for handling materials or tools coated with oil, grease, or other slippery agents. The gloves are available in four styles: fully coated gauntlet, fully coated knitwrist, palm coated knitwrist, and palm coated safety cuff. The fully-coated styles are made on the curved-finger, wing-thumb pattern with pre-flexed finger joints. *Edmont Mfg. Co.*

For more data, circle No. 10 on card.

Wet-Mix Gun Applicator

This unit is simple, inexpensive, compact, and rugged. Designed to apply pre-mix gun application refractories and insulations, it will operate with any thick mixture on any surface, according to producer. Either gas or electric driven, the Refract-All unit is said to handle all refractories, even rock wool. All nozzles have fingertip controls. Units are available in 1000-, 2000-, and 3000-lb sizes. Shoots many difficult materials, such as petroleum still linings, boiler linings, fired regenerator linings, vessel corrosion and abrasion resistant linings, and other hard-to-handle types of mixtures. *Peterson Foundry Supply Co.*

For more data, circle No. 11 on card.

Anti-Corrosion Coating

Zincilate, a new one-coat, self protecting, anti-corrosion coating, can be applied through spraying, dipping, or brushing. Manufacturer claims product offers longer-lasting protection for all iron, steel, and aluminum articles heretofore requiring galvanizing, cadmium, zinc plate or other coatings. All units available in 1000, 2000 and 3000-lb. sizes. *Industrial Metal Protectives, Inc.*

For more data, circle No. 12 on card.

Materials Handling Shovel

The Shoveloader is said to have up to 66 per cent more lifting power than comparable units, with a cost-per-pound of 40¢. The loader is supplied in six models, rated by capacity, dumping height, and forward reach, and is mounted on four types of industrial tractors. Basic attachment is a material bucket, intended for materials loading and unloading. Also included are a combination coal and snow bucket, bulldozer, lifting crane, sweeper, rear leveling blade scarifier, and logging fork. Unit is equipped with double-acting hydraulic cylinders. *Baker-Lull Corp.*

For more data, circle No. 13 on card.

Reader Service Dept.

53|7

Please send me detailed information on the Products and Processes.

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19

★ Please print or type information below

NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R., CHICAGO, ILL.

Reader Service

AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

Chicago 5, Illinois

Free Foundry Information

For additional information

use postcard at bottom of this page

Flexible Tubing

Catalog (C2-4) gives detailed information on Spiratube A and Spiratube R, two types of highly flexible lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of specially treated multicoated fabric. Spiratube A is designed for ventilation, dust removal, fume disposal and similar applications, either blowing or exhausting. Spiratube R, with built-up extra thicknesses of rubber, Neoprene, or other polymers, is designed for materials handling, current installations carrying such products as carbon black, sugar cotton, dry cement, flour and granulated chemicals. Booklet also describes Flexflyte, smaller-diameter tubing for the same uses as Spiratube, and contains detailed specifications, air friction charts, data on oil and chemical resistance and application information. *Flexible Tubing Corporation.*

For more data, circle No. 14 on card

Turret Trucks

A new catalog featuring a line of Turret Trucks for horizontal materials handling in every kind of industry has just been released. The turret trucks are low cost economy units for moving any material or merchandise that can be palletized, handled on skids, in tote boxes or loaded on a platform. They are manufactured in five models for almost every type of horizontal transporting job in plants and warehouses. *Hyster Company.*

For more data, circle No. 15 on card

Band Saws

Five brochures describing high speed band saws and tilting arbor mitre saw benches are now available. The informative bulletins give a thorough description of the equipment and through illustrations show many practical applications of their use. *Tannewit Works.*

For more data, circle No. 16 on card

Dust Collector

Six-page bulletin (No. 915) illustrates the engineering features of the new dust collector unit which uses the principle of reverse air flow for continuous cleaning of the cloth filters. The self cleaning collector is continuous operating, requiring no periodic exhauster shut down for cloth cleaning. Collector resistance remains relatively constant, since dust accumulation on the cloth surfaces is maintained at a uniform value through continuous cloth cleaning. *Pangborn Corporation.*

For more data, circle No. 17 on card

Blast Cleaning

New pocket-size two-color booklet illustrating small standard units for blast cleaning and dust collection applications is now available. This unique booklet has two front covers. One cover opens onto blast cleaning pages. Turning the booklet upside-down puts the cover of the second section, devoted to dust collection, in proper reading position. Each section lists significant industrial applications, recommends the proper equipment for each and illustrates the various models. *Pangborn Corporation.*

For more data, circle No. 18 on card

Testing Machines

Eight page folder illustrating current Amsler machines for test in tension, compression, torsion, shear, fatigue, bending and ductility. Separate bulletins available on wear testing and testing of miniature samples. *Buehler, Inc.*

For more data, circle No. 19 on card

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R. CHICAGO, ILL.

Reader Service

AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

Chicago 5, Illinois

Reader Service Dept.

53|7

Please send me detailed information on the Foundry Information circled.

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19

★ Please print or type information below

NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

Letters to the Editor

All letters of broad interest which do not violate A.F.S. policy or good taste are publishable. Write to Editor, American Foundryman, 616 S. Michigan Ave., Chicago 5, Ill. Letters must be signed but will be published anonymously on request.

Ideas on Determining Silicon

Having been a chemist for some years at Pullman Car & Manufacturing Corp. in Michigan City, Ind., and now an associate professor of Mechanical Engineering at the University of Illinois, I read with interest A. E. Cartwright's method of determining silicon in malleable iron in the May issue of the AMERICAN FOUNDRYMAN.

The idea of cooling the hot crucible on a copper block is an excellent one. I only wish I had thought of it years ago when I ran these tests.

I should like to make a few suggestions that may speed up the method.

Instead of using a Gooch crucible, why not use filter paper with a platinum cone inserted into the glass funnel?

Second, why not use twice the factoral weight of silicon in silicon dioxide as your weight? The operator merely has to divide the final weight on the balance by two.

Third, how about placing the wet filter paper containing the carbon and silicic acid in nickel crucibles and igniting in the muffle furnace which has a stream of oxygen passing through it? I found that the oxygen cut down the burning time of the filter paper and speeded the hydration.

CARL E. SCHUBERT, *Assoc. Prof.*
Mechanical Engineering Dept.
University of Illinois

This is in reference to the article *"Rapid Control Method for Silicon in Malleable"* by A. E. Cartwright, which appeared in the May 1953 issue of AMERICAN FOUNDRYMAN, page 93. I believe that a more rapid method would be as follows:

1. Prepare the sample as per Mr. Cartwright.

2. Weigh a 1.0 gram sample and transfer to a 250-ml Vycor beaker, and add in succession 3 ml nitric acid (sp. gr. 1.42), 2 ml hydrochloric acid (sp. gr. 1.19), and 10 ml of perchloric acid (sp.gr. 1.67). When the sample is in solution, fume heavily for 3 to 4 minutes. Replace cover glass, grasp beaker with tongs and cool by plunging beaker into ice cold water. Add 50 ml of boiling hot distilled water, and proceed as in the procedure given by Mr. Cartwright.

The use of a Vycor beaker allows one to cool the contents very quickly, thus saving time. Nitric acid is recommended to destroy the easily oxidizable matter before the oxidizing effect of the hot concentrated perchloric acid takes over. In this way the chance of an explosion of the reaction of the perchloric acid with the graphitic carbon, is eliminated. The addition of boiling hot water to the cooled perchloric acid solution saves time in that the solution does not have to be brought to boiling before filtration.

ALBERT C. HOLLER,
Dir. Chemistry Div.
Twin City Testing & Engineering Lab.
St. Paul, Minn.

Cartwright's Response

It is a pleasure to receive Prof. Schubert's letter. In studying his suggestions, I conclude that I have fallen into an error—that of attempting to emphasize the shortness and speed to a procedure by reducing the description of it to a degree of terseness sufficient to detract from the value of the description. This I will attempt to remedy, by discussing his suggestions in the order given.

The platinum Gooch, once prepared is quicker to handle from determination to determination. Then, the washing out of iron salts is speedier and more effective with the Gooch using small increments of wash solution than would be the case with filter paper under suction (as I presume the use of a platinum cone implies). The pad may be flooded with wash solution easily, whereas one would not attempt to flood a filter paper.

Filter paper under suction is less easily washed owing to the varying vacuum over its surface and through its folds which causes the wash solution to follow the path of least resistance. This may be demonstrated by filtering and washing out a highly colored liquid. Next, the speed of drying, ignition and cooling using the platinum Gooch is superior to that when using filter paper in a silica or nickel crucible. This is discussed more fully in its proper order.

The second point—using a multiple of the factoral weight—is well taken. In our case we have become inured by custom to reading off Si equivalents from SiO_2 weights from a table laboriously prepared and hung above the balance by some individual long since departed.

Regarding the third suggestion, let us consider that we are dealing with samples of iron in which the carbon is (or should be) entirely in the combined state. Any trace of primary graphite is, in any case, oxidized during the perchloric acid digestion. Therefore we have nothing to accomplish in ignition except to completely dehydrate the pad and residue. This makes the use of oxygen unnecessary.

On the other hand, using filter paper, it would be impossible to attain this end with comparable speed without the use of oxygen as you have no doubt noticed that it is as, or more, difficult to burn off the last traces of occluded filter paper carbon as it is of the last of the component graphite in the residue from a graphitic iron. Then, apart from the greater speed of heating and cooling of platinum compared with nickel, I would be averse to the use of a nickel crucible (especially with oxygen) owing to the readiness with which a not particularly adherent oxide is formed on the nickel which might tend to contaminate the residue.

Incidentally, we are using this method also for gray irons (though simplicity rather than speed dictates this) and find that the graphite is burnt off almost as quickly and ignition completed as rapidly as for non-graphitic irons. This probably is due to the fact that about 70 per cent of the graphite in the sample is destroyed during the perchloric acid digestion.

Modifies Procedure

I would like to thank Mr. Holler for his discussion and to offer some additional remarks on this subject.

Further experimentation with the procedure described has brought to light the following improvements:

1. The addition of 2 ml of sp. gr. 1.20 nitric acid with the perchloric acid removed a condition of spattering experienced with using straight 70-72 per cent perchloric acid. The danger of explosion through rapid oxidation of carbonaceous matter is non-existent with the iron in question since practically all of the carbon is in the combined state. Further, in using this method with gray irons, no tendency to excessive or instantaneous reaction has been noted even though about 70 per cent of the graphite present is oxidized. This is undoubtedly due to the relatively low chemical reactivity of carbon in the graphitic form.

Results using additions of concen-

continued on page 96

Foundrymen in the News

L. C. Wilson

Lee C. Wilson has joined the firm of Lester B. Knight & Associates, Chicago. Mr. Wilson is a past president of AFS and an Honorary Life Member. In 1940, he was awarded the Frederick A. Lorenz Gold Medal by Steel Founders Society of America for contributions to advancement of the Steel Casting Industry and in 1953 was elected to Honorary Membership in the Society. He will continue to do limited work for Ross-Meehan Foundries, Chattanooga, Tenn. In 1948-50, together with Ross-Meehan, he served as consultant to National Security Resources Board of the U. S. Government, Surveying the Foundry Equipment Manufacturers Industry on preparedness for Emergency. Until recently he was manager of the Reading, Pa., branch of Bearings, Inc., Philadelphia.

American Brake Shoe Co., New York, has announced several recent changes in its organization. **John L. Goheen** has been appointed district manager for commercial research on the West Coast. He will supervise market studies and the development of new applications for the company's standard products. Brake Shoe is planning to start production in this area of specialty cast irons. **Francis B. Herlihy,** formerly assistant chief metallurgist, has been appointed chief metallurgist. **George L. Anderson** has been appointed assistant to the general purchasing agent. He will be responsible for the purchasing of foundry supplies, coke and ferro-alloy and petroleum materials.

Ralph R. West, president of West Steel Castings Co., has been elected president of the Cleveland Engineering Society. A member of the board for the past three years, Mr. West becomes the Society's 70th president, and will head up the local engineering organization for the 1953-54 season.

M. B. Terry has been appointed resident of American Brakeblok Div., of Brake Shoe. He was formerly executive vice-president, and succeeds **W. T. Kelly, Jr.,** who continues as vice-president of the parent company and president of the Kellogg Div.

Election of **E. M. Swartz** as vice-president of United States Radiator Corp., Detroit, has been announced. In his new capacity, Mr. Swartz will be responsible for supervision of manufacturing for the company's Steel Div.

American Machine & Foundry Co., New York, has added **Robert S. Sweeney** and **Rex D. Marsh** to the management group of the company's Leland Electric Div., Dayton, Ohio. Mr. Sweeney joined Leland as divisional vice-president and general manager, and Mr. Marsh as sales manager.

L. E. Grubb has been appointed general superintendent of the Huntington W. Va., works of the International Nickel Co., New York, and **P. H. Flynn** was named to succeed Mr. Grubb as general superintendent of Inco's Bayonne, N. J. works. Mr. Flynn was assistant superintendent of the Bayonne, N. J., works.

L. E. Grubb . . . Superintendent

Edward H. Platz, Jr., manager of alloy sales, Lebanon Steel Foundry, Lebanon, Pa., was awarded the Certificate of Service by the Department of Commerce, Washington, D. C. He served as commodity industry specialist in the Iron and Steel Division.

At a recent meeting of the Board of Directors of the Rosedale Foundry & Machine Co., Pittsburgh, Pa., **Charles H. Evans** and **Paul H. Magnus, II,** were elected vice-presidents. Mr. Evans, superintendent of the company, has been with the firm for 44 years. Mr. Magnus has been with Rosedale as assistant superintendent for four years.

Paul H. Magnus II . . . Rosedale V.P.

Charles H. Evans . . . promoted

P. H. Flynn . . . Inco man

The appointment of **Louis W. Adams, Jr.** as technical sales representative for the Pig Iron Div. of the Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., has been announced.

continued on page 26

Foundrymen in the News

continued from page 24

Walsh Refractories Corp., St. Louis, Mo., has announced the following appointments: **Paul L. Hershfield,** chairman of the board, has been elected president replacing **J. L. Crawford,** who resigned; **A. J. Tomasek,** formerly chief engineer has been promoted to the office of executive vice-president; **John J. Duggan** has been promoted to sales manager, glass refractories; **W. K. Schweickhardt,** formerly district sales manager, Chicago office, has been promoted to sales manager, general Refractories; and **Thomas W. Gill** has been re-elected secretary and treasurer.

Promotion of two officials of the Kennedy Valve Manufacturing Co., Elmira, N. Y., has been announced. **Carl H. Morken,** formerly works manager, has

Thomas S. Turkington . . . secretary

Carl H. Morken . . . mfg. V.P.

been appointed vice-president in charge of manufacturing, and **Thomas S. Turkington,** controller, has been given the additional position of secretary.

Appointment of **A. A. Throckmorton** as alloys division manager in charge of sales for primary pig, ingot and billet products and special foundry ingot has been announced by Kaiser Aluminum & Chemical Sales, Inc., Oakland, Calif. Mr. Throckmorton, with the Kaiser firm since 1947, during the past nine months has been with the Aluminum and Magnesium Division of the National Production Authority in Washington, D. C., serving as chief of the products branch and as acting deputy director.

Cooper Alloy Foundry Co., Hillside, N. J., announces the appointment of **Morton L. Katz** as chief shell mold

Anthony A. Miano . . . standards

Morton L. Katz . . . shell mold chief

engineer, and **Anthony A. Miano** as standards supervisor in the Stainless Engineering & Machine Works Division.

Link-Belt Co., Chicago, has appointed **Harvey V. Eastling** assistant general manager of its Pacific Division, with headquarters at San Francisco, and **Donald E. Thal** as sales manager of the

Harvey V. Eastling . . . asst. manager

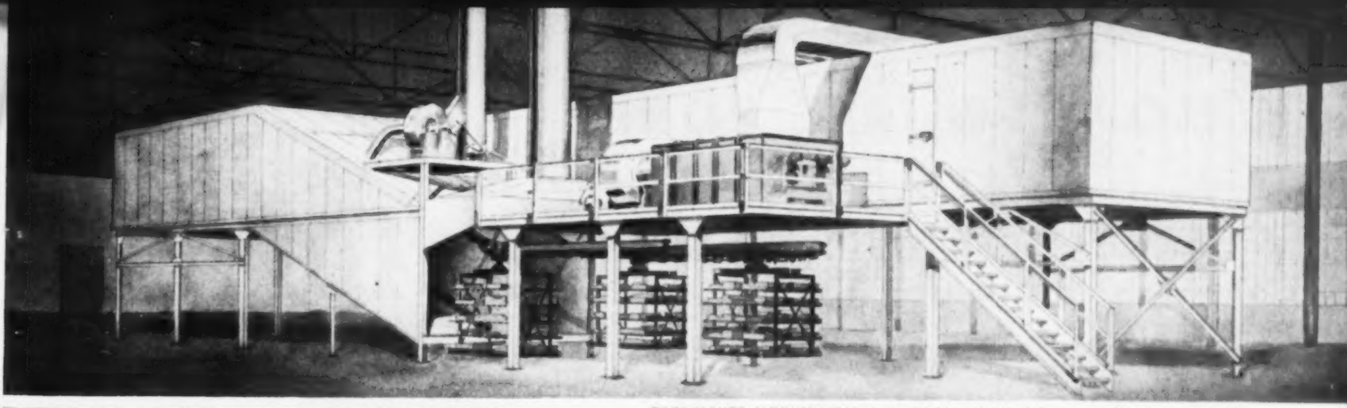
San Francisco plant. Mr. Eastling, formerly general sales manager for the Pacific Division, started with the firm in 1925. Mr. Thal started with the firm in 1935 and recently served as assistant sales manager as San Francisco.

The Board of Directors of Lehigh Foundries, Inc., Easton, Pa., and its affiliate Lehigh Manufacturing Co., Lancaster, Pa., has announced the election of **Alvin A. Shumann** as president of both companies and the election of **Fred C. Krauss** as treasurer of Lehigh Foundries, and its subsidiaries. **Frank E. Shumann,** who has served as president since 1927, will assume the newly created office of chairman of the board. In assuming the presidency, Mr. Shumann stated, that the company would continue and accelerate the program of expansion started in 1945 when it acquired what is stated to be one of the largest and most modern all-electric foundries in the country.

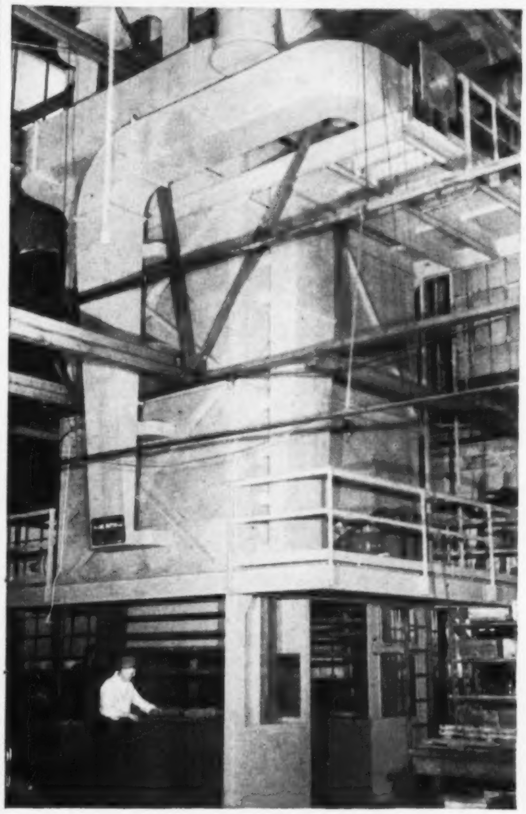
Jack B. Bisanz has been appointed sales engineer, covering Eastern Michi-

Jack B. Bisanz . . . in sales

gan and Northern Ohio, for the Foundry Products Division, Frederic B. Stevens, Inc., Detroit.



CARL-MAYER HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.
Patent No. 2355814

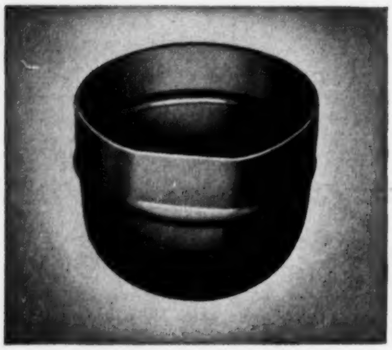


CARL-MAYER VERTICAL CORE OVEN
at G. & C. Foundry Company
Patent No. 2257180.

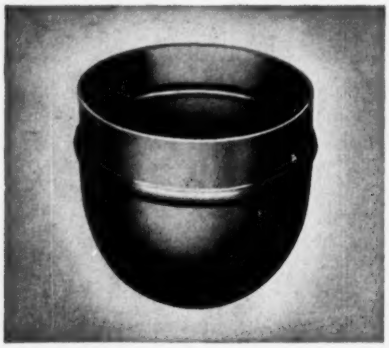
CARL-MAYER MOLD OVEN. One of a battery of two at Pittsburgh Steel Foundry Corp. Capacity: 100 tons per charge (each oven). PATENT APPLIED FOR.

NO. 1 SOURCE FOR

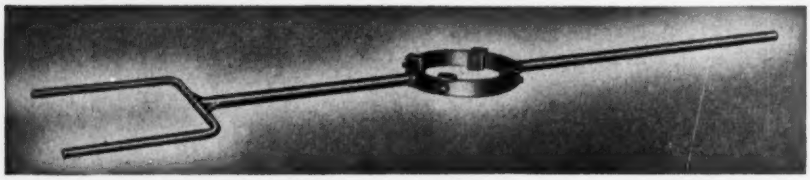
Bowls · Shanks · Tongs



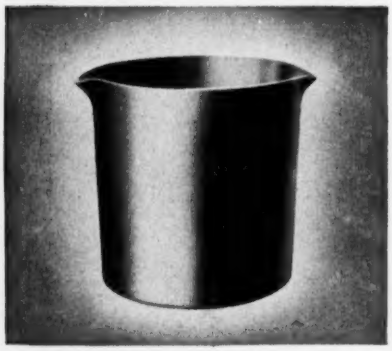
Industrial Equipment round bottom pressed steel ladle bowl, 50 lb. capacity, type 7 flat side.



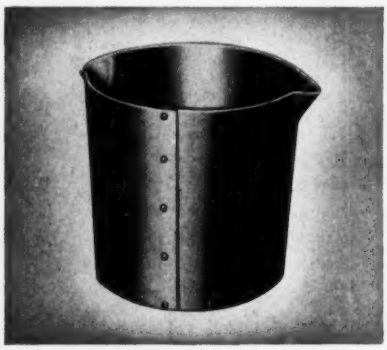
Industrial Equipment round bottom pressed steel ladle bowl, 60 lb. capacity, type 14 circular.



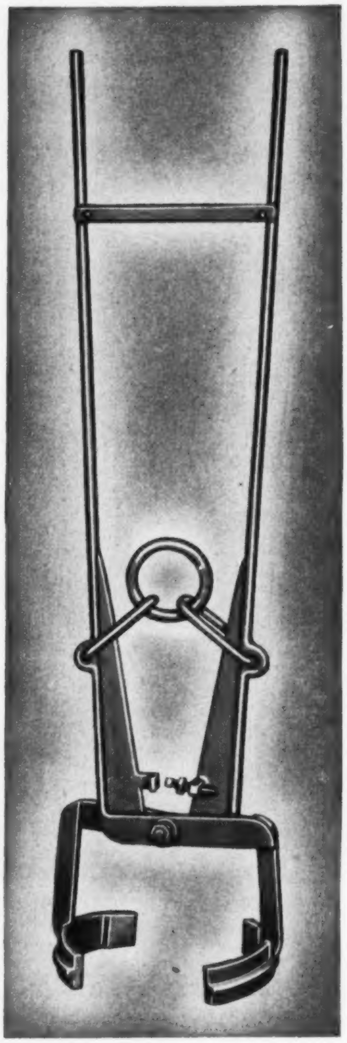
Industrial Equipment type 30CA single and adjustable ladle and crucible shank. Four-point suspension . . . easily adjustable . . . no springs . . . air cooled band. Fixed band types also available.



Industrial Equipment type 514 flat bottom welded steel ladle bowl. Available in almost any size or thickness.



Industrial Equipment 537 flat bottom riveted steel ladle bowl.



Type 72C crucible tongs. Adjustable. Four-point suspension. Claw types also available.

The above Industrial Equipment products, along with dozens of other types of bowls, shanks, tongs and ladles, are included in our latest catalog. *Write for your copy.*

LADLES SHANKS BOWLS TONGS

Industrial

EQUIPMENT COMPANY

115 NORTH OHIO ST., MINSTER, OHIO

Talk of the Industry

FOAM RUBBER BLANKETS might be the answer to cleaning room noise caused by chipping on heavy castings, a foundryman called to say, after reading the item on reduction of shop noise in the last month's "Talk of the Industry." Much of the noise, he says, is due to vibration of the casting which could be muffled with foam rubber.

CULLS FROM THE POTATO CROP are supplying the binder for cores being produced on an experimental basis. Work so far has centered in a university and in a steel foundry research laboratory. Results are promising but investigators still have a few bugs to overcome.

CAST IRON GUTTERS are popular as eaves troughs in England. To produce them Walter MacFarlane & Co., Ltd., has developed a die press process in which a die automatically forces molten iron in a metal trough into the familiar semicircular, cross-sectional gutter. The top die displaces the small amount of excess metal poured and remains in position under a controlled time cycle until the metal solidifies and cools sufficiently. Correct times for pouring and for removal of casting are indicated by signal lights. Mold is protected by soot from a torch applied prior to pouring. Final step in production is trimming of "flash" and a small amount of grinding.

UNDERCOATING an automobile reduces road noise so why shouldn't it help quiet a foundry? One progressive shop that reasons that way will soon test the idea by treating its tote boxes and tumbling mills. Ought to work in any situation where castings are handled in tote boxes, skip hoists, and chutes.

SMALLEST FOUNDRY used in education is believed to be at Brooklyn Polytechnic Institute where students learn foundry fundamentals in an area of only 700 sq ft. In this small space, six can perform sand tests, another 12 can mold, and there's still space left over for Prof. W. H. Ruten.

TUBULAR STEEL CASTINGS can compete economically and profitably with large aluminum forgings weight for weight and, in addition, have superior corrosion resistance, writes a step-ahead-of-the-industry thinker. Stress evaluations on landing gear components show cast steel has superior fatigue resistance and freedom from intercrystalline corrosion, he states.

Now *Hotpoint* pays 40% less

Cast-in screw thread demonstrates close tolerance and improved finish produced by shell molding technique as practiced by Woodruff & Edwards, Inc., Elgin, Ill. Minor grinding for removal of gates and runners is only finishing step required.

for this part...

cast to close tolerances at much lower cost with Resinox-bonded shell molds

Shell molding helps industries producing for the mass markets to take advantage of new production efficiencies that result in:

- **lower end-unit cost**
- **greater flexibility of product design**
- **higher quality**
- **quicker adjustment to the needs of the market**

For example, Hotpoint's new automatic dishwasher with its "Phantom Drain" unit. By shell-mold casting of gray iron parts, Woodruff & Edwards, Inc., who supply this part to the Hotpoint Co., sliced unit production costs nearly in half by a 100% elimination of machining costs. Threads are cast to exact specifications and close tolerances are held throughout the finshed part. Improved design was another gain, since the smoother cast surface offers less resistance to the flow of water when the dishwasher is in use.

Monsanto will be glad to tell you more about the cost-saving advantages of new foundry techniques made possible through research in industrial resins. In addition to resins for shell molding, Monsanto also supplies phenolic and urea core binders, and Lytron-886 sand conditioner. For further information on these new products and processes, fill in and mail the handy coupon below.

Resinox, Lytron: Reg. U. S. Pat. Off.

Cutaway of "phantom drain" unit used in Hotpoint's automatic dishwasher.

MONSANTO®

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY
Plastics Division, Room 5615, Springfield 2, Mass.

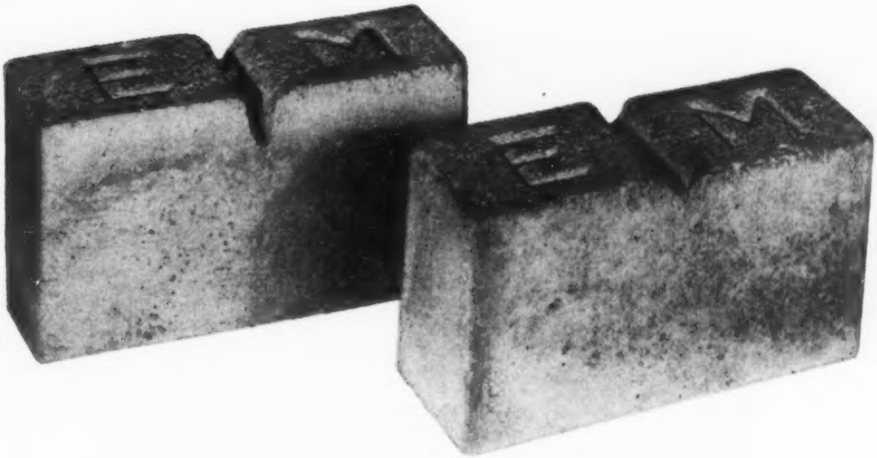
☐ Please send me your free booklet, "The Shell Molding Process."
I would like information on: ☐ Monsanto resins for shell molding, ☐ Monsanto resins for core binding, ☐ Lytron sand conditioner.

Name & Title ______

Company ______

Address ______

City, Zone, State ______



For lower cost and more convenient handling

USE ELECTROMET'S

PALLETIZED SILICON BRIQUETS

A new briquet designed especially for shipment on pallets has been developed by ELECTROMET. The briquet is shaped like a brick so that it can be stacked on pallets for more convenient and economical handling. These pallet shipments, which are available at no extra charge over bulk shipments, can easily be unloaded and handled in your plant by lift truck or overhead crane. Handling costs are reduced and inventory-taking is simplified. The pallets are expendable and need not be returned.

"EM" palletized silicon briquets are about 6 in. x 3 in. x 2 in. in size, weigh 5 lb. gross, and contain exactly 2 lb. of silicon. The briquets are notched, so that they can easily be split in half when 1 lb. additions of silicon are desired. Because they contain an exact amount of silicon, these briquets offer close control of analysis in cupola melting operations.

Silicon is a deoxidizer, cleanser, and softener of gray iron. Silicon briquets offer a practical, convenient, and economical means of adding this alloy. Ask to have one of our metallurgists call and explain more fully the advantages and use of "EM" silicon briquets.

Pallets holding approximately 4,000 lb. of "EM" silicon briquets can easily be handled by lift truck.

This lifting device is used to handle pallets with an overhead crane. An ordinary sling can also be used.

The terms "Electromet" and "EM" are registered trade-marks of Union Carbide and Carbon Corporation.

ELECTRO METALLURGICAL COMPANY

A Division of Union Carbide and Carbon Coroporation

30 East 42nd Street UCC New York 17, N. Y.

OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco

In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

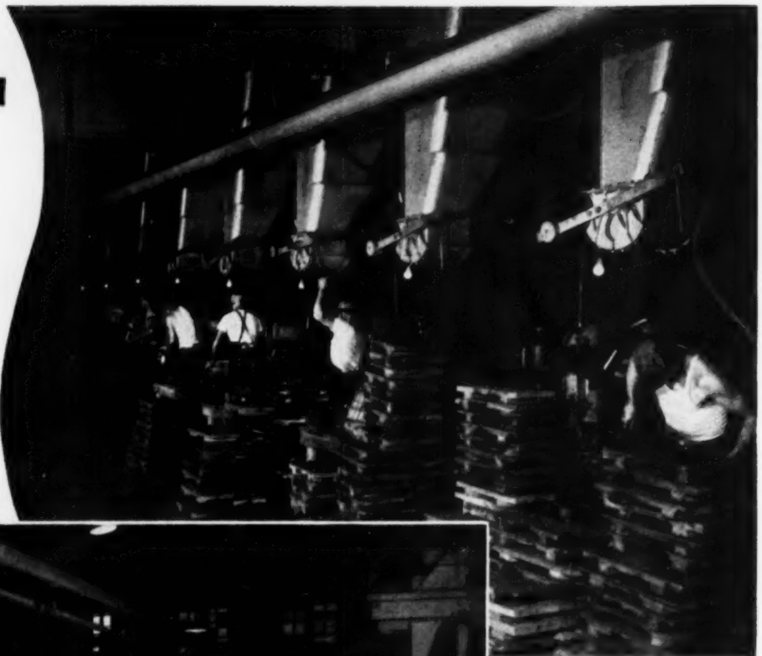
Electromet

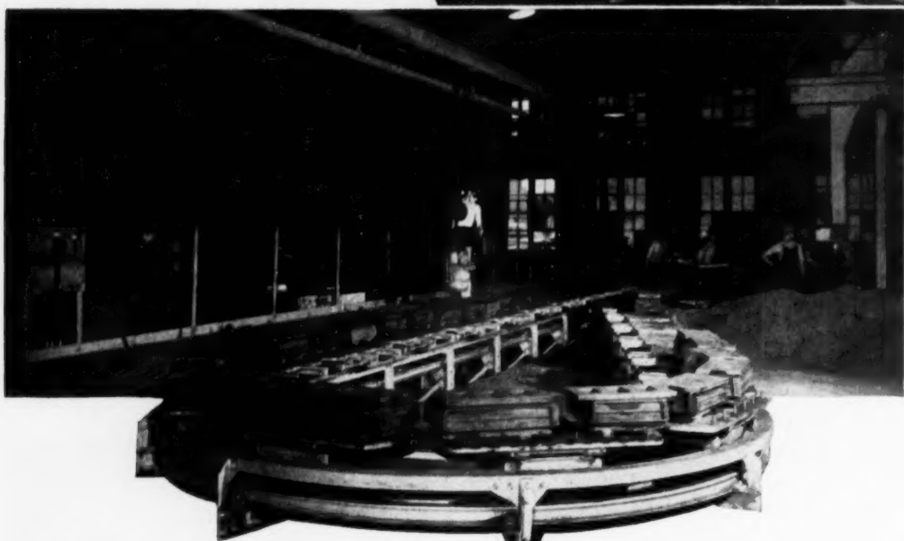
TRADE MARK

Ferro-Alloys and Metals

NO MODERNIZATION WITHOUT MECHANIZATION

So Call In a JEFFREY ENGINEER





These two photos depict a Jeffrey-equipped Foundry. It is completely modernized to provide the ultimate in plant efficiency. Our Foundry Engineers are generous in their desire to help you modernize your operations.

- Aerators
- Bucket Elevators
- Chains
- Clamshell Valves
- Cleanarators
- Crushers

- Casting Conveyors
- Disintegrators
- Feeders
- Flask Fillers
- Apron Conveyors

- Paddle Mixers
- Power Scoops
- Mold Conveyors
- Screens
- Sanditioners

There must be a heap of satisfaction in having a completely-modernized Foundry . . . a smooth-running and harmonious system. Jeffrey has the equipment . . . the engineers to help you do just that . . . provide performance that enthuses the owner and the foundry superintendent alike. Give us a chance to go to work for you.

THE JEFFREY MANUFACTURING CO.
ESTABLISHED 1877
Columbus 16, Ohio
sales offices and distributors in principal cities
PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . .*IT'S A JOB FOR JEFFREY!*

Editorial

Isn't It Good Business?

■ Planning for the technical sessions of the 1954 AFS Convention and Exhibit was going on even as 1953 Convention sessions were in progress. This "king is dead, long live the king" type of development has made for constant improvement in the quality and practicality of Convention papers. Result is that over 3,500 (exclusive of ladies) registered for this year's Convention to make it the best attended non-exhibit meeting the Society has ever staged. Papers already are being solicited and screened for 1954 in preparation for the expected 15,000 attendance at the AFS Foundry Congress and Show in Cleveland, May 8-14.

Despite this year's heavy attendance, many people who should have been present failed to evaluate properly the practical value of the meeting, judging from subsequent requests for information on the D-process (see pages 50-51) and high-pressure molding, and for Shop Course and Round Table Luncheon papers, which generally are not published. Some details of these two interesting molding processes were first publicly disclosed during the recent convention at a Sand Shop Course session on *"Evaluation of Molding Methods."*

Neither process was actually scheduled for discussion, but their spontaneous mention from the floor is indicative of the tremendous interest in new molding methods that the foundry industry is currently enjoying. The session—designed to help foundrymen decide how best to apply the various molding processes at their disposal—developed the fact that this remarkable trend has foundrymen thinking in terms of "precision" castings, regardless of molding method or medium.

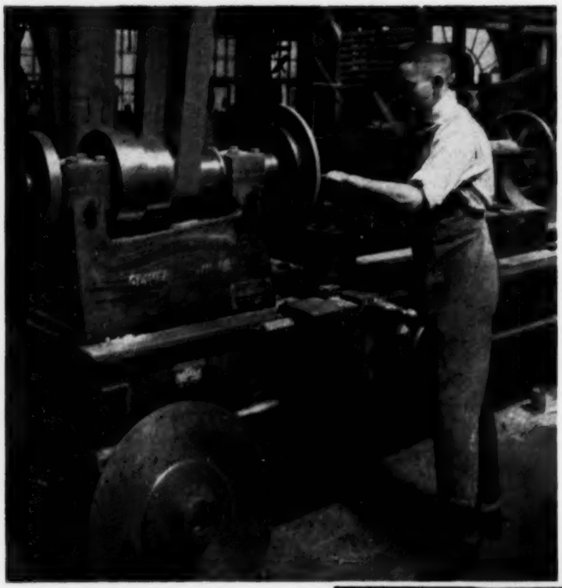
That the disclosure or introduction of new techniques and developments is not limited to the biennial Exhibits, although perhaps more graphically portrayed at those events, was abundantly demonstrated at this year's non-exhibit Convention in Chicago. Why, then, was this year's "record" attendance only 3,500? Why not 5,000, or 10,000, or even 15,000 every year? Certainly not all the foundrymen were there who could have profited from the many practical papers and discussions . . . from the opportunity to question speakers about specific plant problems.

Participation in an AFS Convention *with or without* exhibits is one of the best ways for foundrymen to follow the philosophy indicated in the article beginning on the following page. The philosophy: "No matter how good a job you're doing, there's always a better way. Find it!" Foundry management in search of better methods will find the trail leads annually to the AFS Convention. There cooperative foundrymen perform the biggest mass consulting service known in the industry. And it's practically free!

It would seem that foundry management cannot afford to keep in the plant during the Convention, those men who stand to gain *anything* for their companies by Convention attendance. Knowledge and know-how cannot be taxed; investing in them by sending to an AFS Convention *every man who can be spared from production* would seem to be just sound business practice. Wouldn't it?

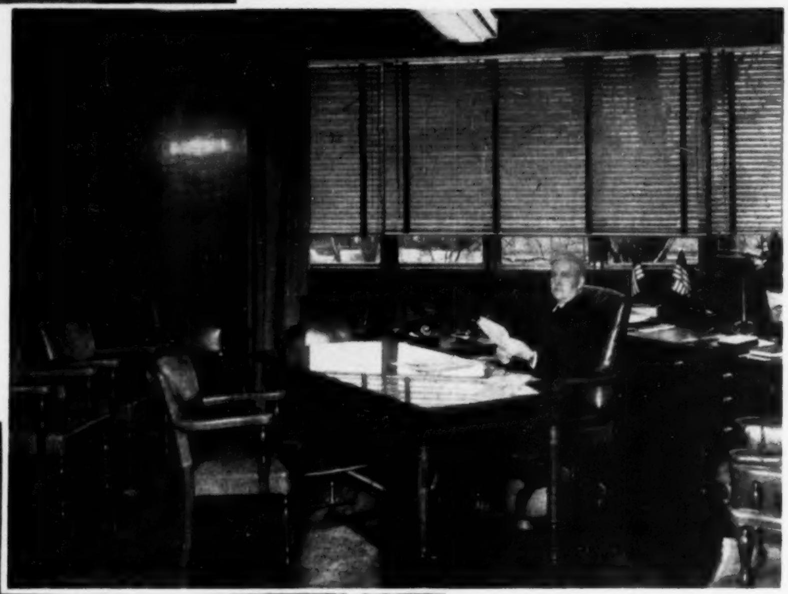
Herbert F. Scobie

HERBERT F. SCOBIE
Technical Editor



During World War I, the metal shop looked like this. In center is pattern for Liberty motor. When coal shortage threatened, a gasoline motor was installed to drive the line shaft.

This old lathe, above, City Pattern's No. 1 piece of equipment, is still with the company. Kept primarily for sentimental reasons, it is used for an occasional large pattern, can swing a 10-ft diameter piece outside the bed at left end. Belt drive long ago gave way to an electric motor.



Above—Vaughan Reid, president of City Pattern Foundry & Machine Co., directs company operations from this office on the second floor of the plant.

Left—Fred J. Coulton (background) and Vaughan Reid pouring first heat of metal in foundry, added when the company built its own plant in 1921. Wooden flasks were standard then and foundry was small. Company now has aluminum shop with floor, bench, and machine molding, a copper-base alloy shop, and a shell molding department.

Bench workers in metal shop are well supplied with small power tools and department is serviced by tramrail.

There's Always a Better Way

FORTY years ago, Vaughan Reid and his brother-in-law, Fred J. Coulton, started the organization which today is City Pattern Foundry & Machine Co. of Detroit. Beginning with three men including the founders—in a 20 x 30 ft room, the company has grown to 300 employees who can provide complete service from blueprint to machined castings ready for assembly. Plant area is over 50,000 sq ft.

The company moved to a 40 x 60 ft third floor room in 1916. In 1917, larger quarters with 8100 sq ft of space were needed for the force, then 70. By 1921, City Pattern was ready for its own foundry and built its own plant, since enlarged twice.

City Pattern now has a wood pattern shop, metal pattern shop, machine shop, bronze foundry, aluminum foundry, shell mold, welding and brazing departments, laboratory (sand, chemical, spectrographic, and radiographic) and engineering department.

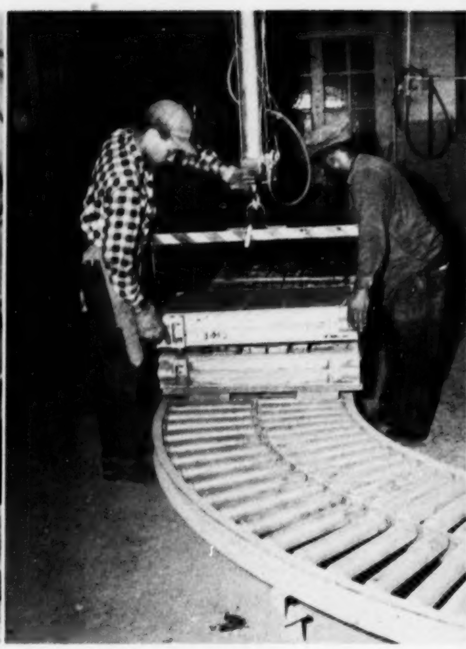
In the early days, many small bench machines were used and the large equipment was driven by belt. Today the finest equipment, such as automatic duplicating machines and imported universal milling machines, is used by the workmen.

The 300 employees are busy six days a week on two shifts turning out wood and metal patterns (primarily automotive and aircraft), shell mold patterns, copper-base and aluminum alloy castings, core rubbing fixtures, core de-finning equipment, core setting fixtures, and equipment for precision application of core paste. The company will make "anything you can put on a drawing we can read."

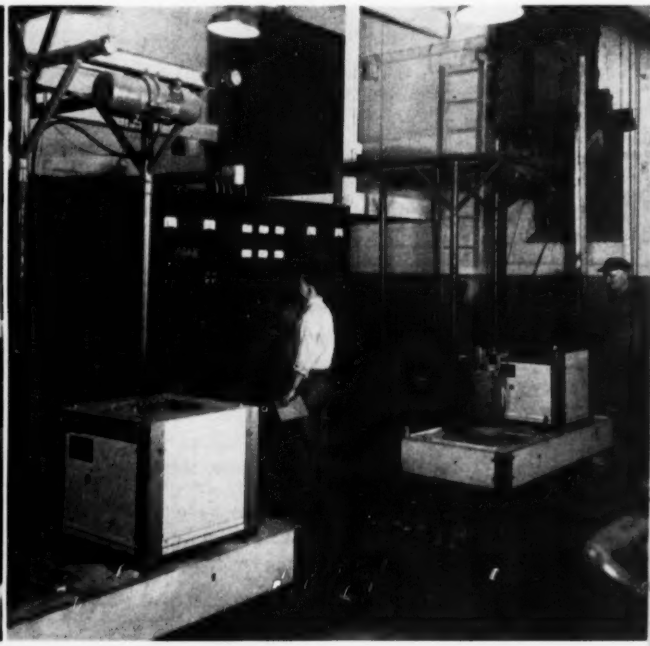
Patterns range from the smallest used to huge metal cope and drag equipment weighing 8100 lb and 7900 lb, respectively, for a V-12 diesel engine block. Most of the castings produced are high-conductivity, high-strength, copper-base alloys for resistance welding machines, but they range from pure copper to all the common brasses and bronzes. Many castings are produced in a 97 per cent copper alloy which gets a precipitation hardening treatment.

During World War II, 92 per cent of City Pattern's production was in aircraft patterns. The company received the Army-Navy E award and later a star.

Headed by Vaughan Reid, president, his son Vaughan C. Reid, vice-president, and Fred J. Coulton, secretary-treasurer, City Pattern Foundry & Machine is the result of the philosophy of its president—"No matter how good a job your're doing, there's a better way. Find it!"

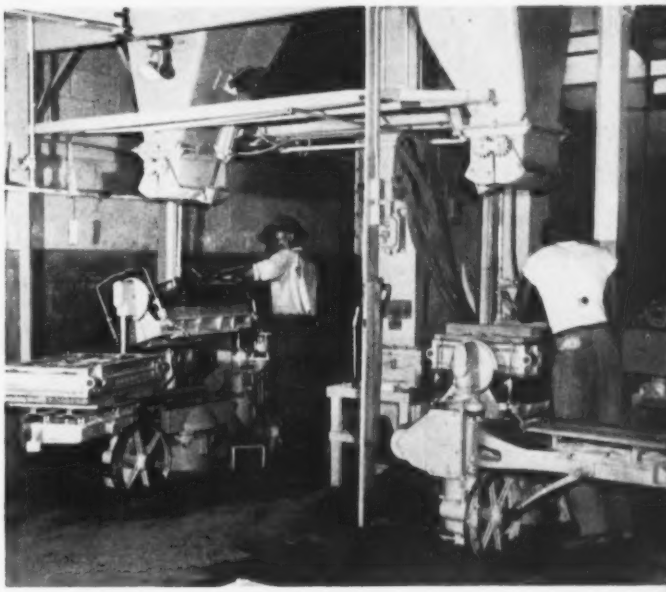


(Left)—Grinding resistance welding machine castings. Made of City Pattern's high-strength, high-conductivity copper alloy, castings have water cooling tubes cast in. (Center)—Closing mold in aluminum foundry. Pins are on side of flask instead of end to permit longer molds to be made on molding machine. Air hoist is inverted to put hand control within easy reach. (Right)—Infra red lamps skin dry molds passed under bank of lamps by means of roller conveyor.



(Left)—Ample space and light characterizes the wood pattern shop where master patterns, models, and patterns for short runs are made. When the ceiling was insulated to reduce the effect of the sun in this second-floor shop, job was finished off with acoustical tile. Sound measurements before and after ceiling treatment show that noise was reduced 30 per cent. (Right)—The furnace room for copper-base alloys includes two lift-coil, high frequency induction furnaces. Using No. 70 crucibles, the induction furnaces replaced eight oil-fired furnaces using No. 70 crucibles and two using No. 90's. Other units in this department are five of the oil-fired type of furnaces with No. 300 crucibles.

Melting area and part of molding area of aluminum foundry where many patterns and driers are cast. Coreroom is at right background. Note ample space and lighting which is characteristic of all departments of the plant. City Pattern is typical of shops which led to AFS slogan: "The Foundry Is A Good Place To Work!"



Two-station molding unit combines cope and drag machines with overhead sand storage integrated with small shakeout and sand conditioning unit. This small, self-contained (except for melting and cleaning) foundry-within-a-foundry produces aluminum driers and represents the high production phase of the company's foundry operations.

Well-equipped sand and chemical laboratory is part of City Pattern's control and research facilities which include a complete spectrographic laboratory and an x-ray machine. Though always seeking a better way, the company does not arbitrarily discard old proven techniques.

Floor molder inserting cooling tubes in mold for resistance welding machine casting. Tubes are bent, brazed, and have locating studs affixed in 3-man welding and brazing shop. Type of molding done in the two foundries calls for range of abilities from skilled molder to machine operator.

Good housekeeping is important throughout the plant as it is in this sand mixing department. Ducts at angle remove fines blown from sand by cooling blasts of air.

Maintenance in the Foundry

T. J. Glaza / *Supt. of Maintenance, Crane Co., Chicago*

Reduction of maintenance costs and importance of preventive and corrective maintenance are brought out in the first paper presented before the Chicago Chapter's new Maintenance Group.

■ A sand system consists of equipment to handle, store, and prepare sand for ultimate use in flasks and machines to make castings. There is a general similarity in most systems; however various engineers assemble these parts in different manners to produce various results.

Most engineers design equipment with good intentions. In many instances, competitive bids are requested without adequate specifications, resulting in a wide range of cost—the lower the cost, the lighter the equipment. Too often equipment is purchased on the dollar value by engineers and purchasing departments with objectional results.

The engineer should never forget that the foundry is going to push for productive results, and if the equipment falls short of requirements, it is the maintenance man that catches the broadside. True, in many instances the engineer is called upon to rectify problems, such as making this heavier, that faster, but at best, remodelling jobs should be avoided.

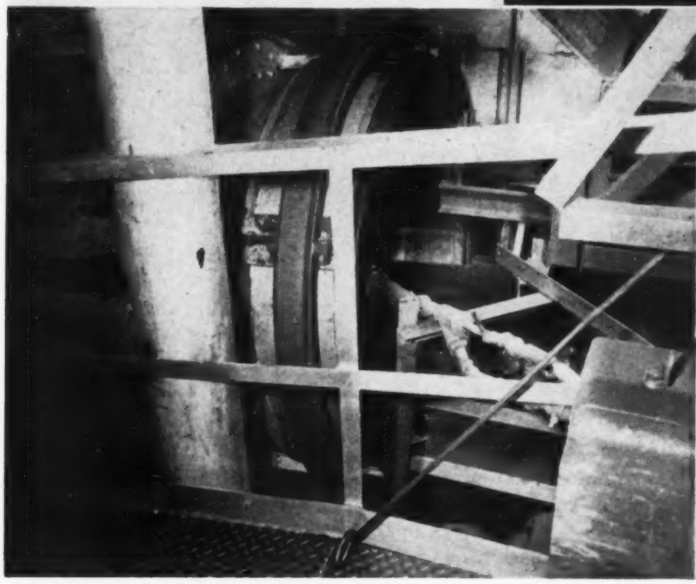
Foremost in the problem of maintenance is good housekeeping. The responsibility for it must be shared jointly by operator and maintenance man, and without cooperation both will pay, one in lost production, the other in excessive maintenance cost. The leaky elevator casing that throws sand out of the elevator, burying the takeups and cleanout access door, is a headache to both operator and maintenance man.

Drives should be made adequate to start with full load under adverse conditions, plus a safety factor. Most manufacturers favor individual reducers and motor combinations, some directly connected, others through chain drives. Such an arrangement is preferred over the gear motor combination where the question of spares and ready replacement always comes up.

Reducer failure caused by leaky seals, improper lubrication, or lack of change of oil, or oil addition is most common. Manufacturers provide excellent data on their equipment, and issue repair instructions to follow. Check gear teeth for misalignment and bearings for wear and be sure to replace leaky seals. This type of equipment requires periodical maintenance, and scheduled service is recommended. When changing gears it is well to change both of a pair instead of trying to be economical by saving one.

Motors from most of the reliable manufacturers are

(Right) Interlocking controls on sand system prevent waste and damage through sand pile-up. When component of system stops, all units preceding it kick out automatically, giving protection and signalling trouble.



(Left) Sand and castings from shakeout feed into rotating screen on vibrating conveyor. Burner heats screen early in day to prevent sand lumps from going out end of screen with the castings when ejected from conveyor.

satisfactory, provided they are totally enclosed, fan cooled, and of ball bearing design. They should be placed as far from dirt as possible, where they can be easily removed, and with access facilities for maintaining them. Even the best motor will not run long under a pile of sand. Further, a drive that is inaccessible due to lack of stair or catwalk will receive little attention. This is true, for any equipment that lacks service facilities.

Magnetic starters, with emergency stop push buttons at critical locations are essential, and interlocking control by sequence to avoid sand plug-ups are imperative. Zero limit switches or their equal will pay for themselves in down time; locate these off the tail shaft, or preferably off the belt where they won't interfere with tail pulley take-up. Don't locate at head pulley which may continue to turn even though belt stops.

Overloads should be properly sized to protect motors. If they keep kicking out, check for mechanical problems as all problems are not electrical. Further, increasing size of overload is not the answer if trouble persists; perhaps the next size larger motor is required.

Limit switches should be substantial and care should be used in their selection, especially as regards keeping out dust and dirt. If they continue to fail, see if the method of actuating them can be altered to decrease shock. Repositioning might be necessary.

Compressed air is often required to operate parts of equipment on sand systems, such as mixer doors, sand plows, air hoists for pushing or lifting, etc. Sizes of air lines should be adequate to minimize pressure drop and large receivers to "level" pressures are worthy of consideration. Air leaks are costly and valve packing should be replaced or tightened as necessary, and possibly the valve should be replaced. When replacing or installing new equipment check type of valves used and consider the diaphragm type which is packless and has improved serviceability.

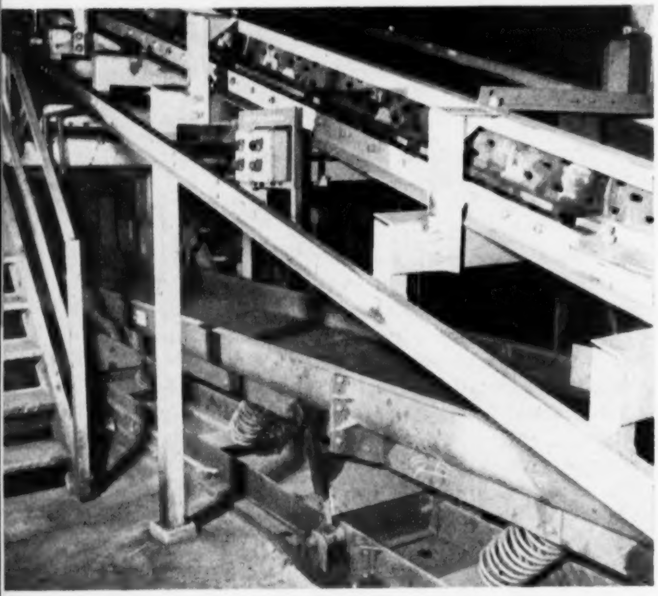
Different Characteristics

Air cylinders as sold by various manufacturers have different service characteristics, but needless to say, a honed and chrome-plated cylinder will outlast and give longer uninterrupted service than one of plain tubing. Seals and gaskets on these units should be checked and reported for correction periodically.

Solenoid valves are generally subjected to dirt and dust which, with contaminants in the air stream, affect their operation. Carefully select those with the fewest moving parts, best seals and gaskets to assure operation. Also, it is advisable to consider facilities for their quick removal and replacement, and adequate spares should be on hand.

The most common means of conveying sand is by belt with its mechanical function consisting of pulleys,

Zero limit switch on far side of sand belt interlocks with preceding conveying equipment, stops it to prevent sand pile-up if this belt stops moving.



Vibrating conveyor takes hot sand from rotating screen to return sand belt, dropping it into spill sand which protects belt equipment from heat damage.

take-ups, idlers, etc. (For a more complete treatise on this subject see *Flow*, March and April 1952.) Application generally determines belt construction and selection, plys and covering. Prepared sand belts, hot sand belts, elevator belts, and special types can be recommended by several reliable firms.

Some common sources of belt maintenance problems and their solution are:

1. Frozen or jammed idlers; not only increase power consumption but are destructive to belt and idlers.

2. Misalignment of equipment and improper splices cause crooked-running belts, result in torn edges. Rectify this by squaring the splice, aligning the head and tail pulleys and checking belt contact and position with carrying idlers.

3. Rips from tramp iron, wire, etc. can be materially reduced by magnetic separation.

4. Burns from hot metal can be somewhat rectified if the sand can be vibrated onto the belt to form a cushion between the belt and the hot metal.

5. Uneven loading causes belts to shift from side to side; answer is to center material by chute alteration.

6. Excessive tension causes bearing, pulley and shaft failure and may be caused by excessive loading, frictional resistance of belt running in sand, poor idler maintenance, or excessive belt tightening.

7. Build-up under head and tail pulleys can be reduced by rubber-covered scraper or using self-cleaning head and tail pulleys.

8. Impact damage requires investigation of loading point.

9. For spare stock inventory reasons, it is advisable for the Engineering Dept. to recommend belts in 6-in. intervals such as 18-in., 24-in. and 30-in., etc. Also it is a good idea to check the need for a vulcanizer to make repairs and splices to eliminate face plate repairs.

White Iron Wheels Last Longer

Apron conveyors generally are used for severe service, or where material must be conveyed up steep inclines due to space limitations. By nature of their construction, they are maintenance problems. Wheel replacement due to wear, lack of lubrication, or abrasion of sand and oil bearings is a constant problem and requires frequent attention. Most designs use replaceable hardened bushings and chilled wheels with grease fittings for lubrication. When the thin chilled tread wears through, deterioration is rapid. Substitution of white iron wheels showed less frequent replacement, the ratio being 3 or 4 to one in the author's plant. One plant reports using permanently lubricated ball or roller bearings with considerable success and long life.

In recent years, considerable advancement has been made in pan or oscillating conveyors. In several instances, they have eliminated maintenance problems and have been used to replace critical belts and apron conveyors. One such instance of a pan conveyor handling 60 tons of hot sand per hour proved its worth by eliminating belt replacement every three to four weeks. Actual repairs on this pan conveyor for a period of over 1½ years amounted to about $5 for springs for that period, plus oil changes every 150 hours of operation.

Oscillating conveyors have the further advantage of leveling the flow of sand and act as feeders. When used to replace apron conveyors, they may have the initial advantage of being less costly to install, lower in maintenance costs, and of eliminating spill sand generally found where apron conveyors are used for handling sand. Various manufacturers make more or less substantial equipment of this type, some with short stroke mechanism, others long.

Try to carry only sand in the elevator by use of magnetic pulley, and in some cases large mesh screens, before sand is thrown into the boot. Production men should check sand discharge into the elevator and periodically clean out the boot to remove sand and castings. More frequently, dig out the packed sand in the bottom of the buckets. Belt men should check belt splices frequently, and loose, worn buckets should be replaced as soon as possible.

Hoppers and tanks for sand storage have been "problem children" to maintenance men since the beginning of foundry mechanization. The method of removal of sand to the mixer has a lot to do with funnelling in sand storage tanks. It is the writer's personal opinion that an apron or vibrating pan feeder is preferred over batch type measuring hoppers due to the restriction required for the latter. Ventilation also will help remove steam which causes sand to adhere to the walls of the tank. Old practice was to line tanks with wood, but the only solution is to clean out these tanks periodically by hand. Rust has been combatted by cladding or rubber, and vibrators have been used to assist flow.

Various designs, materials and shapes have been tried in an effort to eliminate sticking in the molder's hoppers. Too often the molder takes care of the situation by pounding on the hopper, making it worse and eventually requiring it to be replaced. Stainless, clad material, rubber linings, vibrators, and change in design all are potential helps.

Where vertical loading is a problem, straight "up and down" chutes have been replaced by chutes at angles.

Mixer Maintenance a Must

Maintenance of a mixer properly starts when its installation is being considered. Plans for installation should anticipate the space requirements for removing a motor, dropping and removing a transmission, or removing a crosshead or mixer wheel.

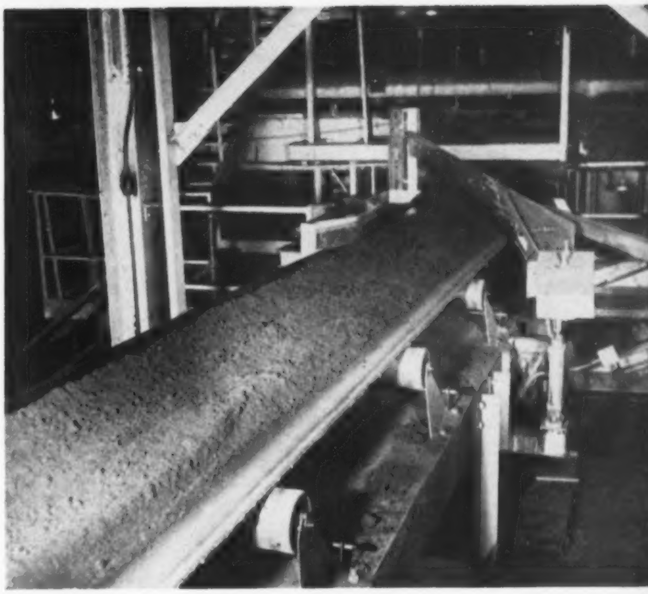
If the mixer has cooling, plan the exhaust stack carefully. It should be as straight as possible so that fines will not settle and build up on the sides. Be sure to provide a large cleanout door. Where the stack is brought into the dust hood of the mixer, include a coupling section that telescopes. Then, to remove the dust hood of the mixer it isn't necessary to burn away a foot of the stack first.

A maintenance manual contains much information useful in getting the most out of a mixer, both in operation and long life. It should be readily available to the maintenance crew.

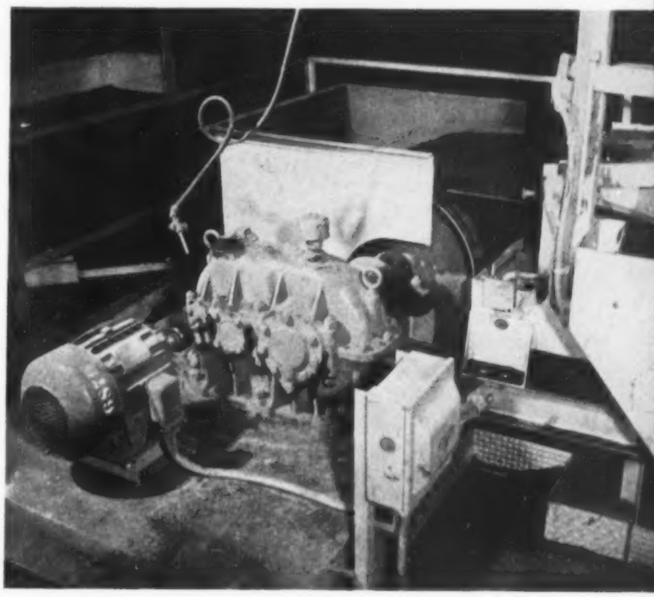
Keeping the lubricant in the gear reducer up to the indicated level is not enough. The lubricant used must conform to the specifications of the mixer manufacturer. All maintenance men agree that sand should not be added to the lubricant, but not all of them take the trouble to clean the area around the filler hole before adding lubricant. Some instances have been reported where the lubricant has been carried in a dirty bucket.

Inspection of the drained lubricant should be made occasionally, possibly with the aid of a magnetic plug, to see if it contains any metal particles that would indicate excessive gear or bearing wear. Mixing wheels should be greased daily, for as long as they have adequate grease their rotation working the grease outward keeps sand out of the bearings.

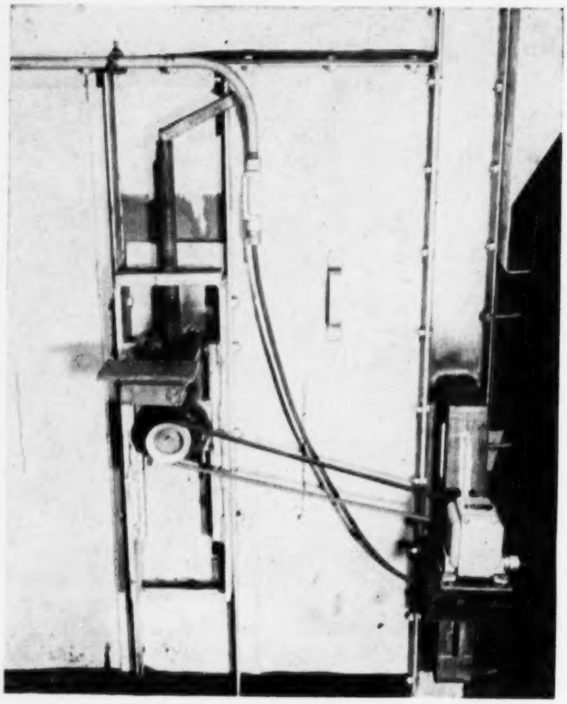
Conscientious lubrication is recommended, but not for everything. Wire ropes, if lubricated, will pick up sand and the flexing and stretching of the rope with the sand will shorten its life appreciably. Some manufacturers do not recommend lubricating wheels on the skiphoist bucket. These wheels act primarily as guides,



Sand centered on belt reduces shifting, makes for uniform wear. Cross plow skims top half of sand onto another belt, is controlled from sand mixer.



Motor, speed reducer, and head pulley of conveyor belt, showing ample space for maintenance work.



Zero limit switch mounted on tail pulley of elevator. Pulleys for switch are selected to drive them at 120 rpm. Above or below that speed, limit switch stops preceding equipment in sand handling system.

have no bearings, and should run dry. If they squeal, try some graphite and kerosene.

In a batch type mixer, clean the plows, bowl, and wheels daily. In a continuous mixer, clean the screw or helical flight, and pan. Scrape and clean around any moving parts such as batch hoppers or bond hoppers so that sand build-up will not cause them to bind in operation. This type of daily cleaning is one of the most important phases of mixer maintenance.

Keep plows adjusted close to the surface over which they pass. Once sand begins to pass between the plow and the surface, plow wear accelerates rapidly. If the plow wears and cannot be kept close to the surface, build it up with hard metal rod or replace it.

Avoid Mixer Overloading

Even if cleaning, lubricating, and adjusting are correctly done, the operators can still run up maintenance costs if the mixer is run consistently above its capacity. Overloading a mixer has all the disadvantages of overloading any piece of machinery, plus being extravagant in the use of binder material. To check overloading, install a recording watt-hour-meter. This shows the real power being used and allows the average power over the complete cycle to be determined.

Check the operation of the batch hopper gates and cylinders periodically. It is especially important that the gates of the bin loading the batch hopper be closed whenever the batch hopper gates are open. If they are operated from the sand valve, one closing and the other opening, then use speed control valves so that one closes before the other opens—otherwise sand will fall straight through defeating the measuring function of the batch hopper.

Maintenance crews are familiar with the common symptoms of mechanical trouble, such as excessive heat, noise, and vibration. These suggest faulty bearings, worn or improperly meshing gears, or misaligned shafts. Production men detecting any of these, or other variations in operating characteristics should report them promptly.

Bearing troubles often spring from improper lubrication, improper shimming, misalignment of the shaft, or contamination by sand. Check for looseness and scoring, cleaning or replacing bearing as determined by investigation. Guard against over-lubrication which can destroy seals.

Inspecting the face of the gear teeth will show if the gears have been meshing correctly. Wear should be even across the entire face of the tooth. Pitting of the tooth surface is usually due to improper lubrication. The gear can wear out from use alone, without adequate maintenance.

Built for Abuse

Rotary barrels and flat deck units serve for both screening and shakeout operations. Problems of replacing wearing bars, grates, rails, screens, perforated plate, etc., are typical of this equipment because it is the one spot where the sand system is expected to take the abuse. Lubrication should be especially carefully checked here for frequency and proper type. Bearing seals are critical because of the presence of excessive sand and fine dust. Special metals for wearing surfaces should be considered at points of abuse. As needed, repair or replace rubber or spring shock absorbers.

The engineer should make sure a shakeout has a good foundation because it isn't easy to replace sheared anchor bolts. Spring or rubber in shear cushions have helped vibration. If the shakeout is rotary, alignment of rolls, shafts and thrust bearings will be a problem until taken care of.

Don't try to repair the grate on a flat deck shakeout until the welder grounds the machine on the grate, not on the frame. The writer knows of several bearings that were damaged because of incorrect grounding.

As on every other kind of machinery, never work on a piece of sand equipment until it is determined that the main switch is open and properly locked open. The lock should have one key. The man working on the equipment should have that key.

Down time—when it does occur—can be kept to a minimum by a careful selection of spare parts, kept on hand. A representative of the manufacturer can assist greatly in this selection. Every piece of machinery has some parts which are best adjusted or replaced in some special manner, and that will be detailed in the maintenance manual. Read it and use it as a guide—it will save time and trouble.

No scheduled program of maintenance is foolproof, and cannot be considered a cure-all. However, breakdowns can be reduced through the cooperation of management, supervisors and the men performing the jobs, plus the alertness of maintenance foremen.

Cleveland in '54

AMERICAN FOUNDRYMEN'S SOCIETY will hold its 58th annual Convention, in conjunction with the biennial Foundry Exhibit, at Cleveland, May 8-14, 1954.

Cleveland's spacious Public Auditorium and underground exhibit hall will house both the technical and administrative sessions and the all-industry show that is the only event of its kind participated in by all branches of the metals casting field.

Floor plans, covering 100,000 sq ft of exhibit space, and utilizing five halls at the Auditorium, will be released in early fall of this year. This procedure will allow prospective exhibitors to prepare their plans for and industry-wide Show that is already evoking international interest.

Long-range planning is under way for a series of technical and practical sessions that will cover all phases of foundry operations and technology. All A.F.S. Divisions—Gray Iron, Malleable, Non-Ferrous, Steel, Material Handling, Patternmaking, Sand, General Interest—are preparing programs with the broadest possible appeal.

Foundry Personnel

Among the thousands of foundrymen who will attend the Convention and Exhibit at Cleveland will be management, research and development metallurgists, educators, operating personnel, and manufacturers and suppliers.

At Cleveland, foundrymen will find one of the heaviest concentrations of metal working plants in the nation, providing unparalleled opportunity for field visitations. In addition, the city provides every facility for housing, dining, shopping and entertainment.

Technical Correlation Committee meeting is shown (left) at Hotel Sherman, Chicago, where group met on June 1.

Technical Correlation Committee Reviews Year's Activities

■ Division and general interest committee officers met June 1 at the Sherman Hotel, Chicago, for the annual meeting of the Technical Correlation Committee. Presiding over the volunteer technical officers of AFS was Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, AFS Vice-President-Elect. Also participating were AFS President I. R. Wagner, Electric Steel Castings Co., Indianapolis, Ind.; President-Elect Collins L. Carter, Albion Malleable Iron Co., Albion, Mich.; Secretary-Treasurer Wm. W. Maloney; and Technical Director S. C. Massari.

Mr. Massari prefaced the presentation of reports with the statement that the purpose of the meeting was to keep chairmen of the various divisions and committees posted on all phases of AFS technical activities, thereby minimizing duplication of effort.

Light Metals Division. Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, outgoing chairman of the Light Metals Division, called attention to the change in name of the former Aluminum & Magnesium Division to reflect its broadened scope which now includes titanium. The latter was represented by four papers at the 1953 Convention, he said. Research on fluid flow is continuing, he stated, indicating that additional outside funds would be forthcoming to augment money already available.

The Alloys Recommendation Committee has published data on magnesium alloys while the Centrifugal Casting Committee is in the process of reviewing research already completed to see what a future program should be. Two sections of the manual in preparation by the Design and Stress Analysis Committee are complete, and it is hoped that the manual will be finished early in 1954, Mr. Brown asserted. The Permanent Mold Committee plans several papers for the 1954 Convention and the Die Casting Committee, which is continuing coordination of its work with ASTM, expects to have one or more papers at next year's AFS Convention and Foundry Show. An outline of a new book on RECOMMENDED PRACTICES FOR ALUMINUM AND MAGNESIUM SAND CASTING has been drawn up by the Sand Casting Committee. The Test Bar Committee plans work leading toward standardization on several test bar molds.

New officers of the Light Metals Division are Manley E. Brooks, Dow Chemical Co., Bay City, Mich., chairman, and E. V. Blackmun, Die Casting Div., Aluminum Co. of America, Garwood, N. J., vice-chairman.

Brass & Bronze Division. Bernard N. Ames, U. S. Naval Shipyard, Brooklyn, presented the report of the Brass & Bronze Division. He suggested that a certificate of recognition be presented to the author of the best Convention paper in each division. Following a discussion it was generally agreed that

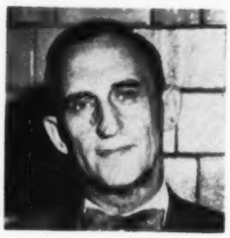
James Thomson

Bernard N. Ames

Milton T. Sell

George W. Johnson

Milton Tilley



W. J. Hebard

presentation of a paper at an AFS Convention was ample recommendation and the committee tabled a proposal that Convention authors receive a certificate and/or money.

The Convention session "Research in Progress" was so successful, Mr. Ames reported, that it is planned to continue progress reports on diverse brass and bronze subjects at future AFS Conventions. During the year, he said, the Recommended Practices Committee completed the text for COPPER-BASE ALLOYS FOUNDRY PRACTICE which has been published. Committees have been appointed to prepare two additional chapters on Inspection and Production Control Methods and Shell Molding.

Liaison with other committees is provided through brass and bronze representation in the Heat Tranfer Committee and the Sand Division. A joint project on the use of synthetic sand in non-ferrous foundries is to be carried on with the latter. Division members were concerned over lack of understanding of the fracture test developed under the auspices of the Brass & Bronze Division, Ames stated, and planned to develop material for publication in AMERICAN FOUNDRYMAN and to provide speakers at the request of AFS chapters.

Nominees unanimously elected at the division business meeting to serve as chairman and vice-chairman, respectively, of the Brass & Bronze Division during 1953-55 are: Mr. Ames and Harry C. Ahl, Down River Casting Co., Rockwood, Mich.

Publication Committee. H. J. Rowe, Aluminum Co. of America, Pittsburgh, Pa., outlined the pricing policy established by the Publication Committee. He listed the following new publications released during the past fiscal year: AFS TRANSACTIONS, VOL. 60; STATISTICAL QUALITY CONTROL; RECOMMENDED NAMES FOR GATES AND RISERS; PATTERNMAKER'S MANUAL; HEALTH PROTECTION IN FOUNDRY PRACTICE; GLOSSARY OF FOUNDRY TERMS, and SYMPOSIUM ON AIR POLLUTION. In addition the following five were reprinted: SAFETY PRACTICE FOR PROTECTION OF WORKERS IN FOUNDRIES; GRAY IRON RESEARCH REPORT NO. 2; CLASSIFICATION OF FOUNDRY COST FACTORS; STUDY OF THE PRINCIPLES OF GATING; and FOUNDRY CORE PRACTICE, 2ND EDITION.

Educational Division. George J. Barker, University of Wisconsin, stated that the division concentrated on education in high school, trade, and vocational schools, and is increasing emphasis on in-plant training. Great effort is needed, he declared, to correlate the

J. S. Vanick

H. Rosenthal

Ralph L. Lee

E. T. Kindt

Jack H. Schaum

Manley E. Brooks

Robert Neiman

Walter R. Jaeschke

James R. Allan

Educational Division's work with chapter educational activities. Only 25 chapters had educational committees during the past year, he said.

In accord with division policies, the Foundry Educational Foundation handles college educational programs. However, Prof. Barker asserted, the division has in preparation a college foundry text book which is expected to be available to colleges in a year.

The AFS Apprentice Committee was more than successful this year, Barker stated, and the Apprentice Contest Committee has already completed its plans for next year. In the national competition this year, he said, there were 296 entries from 88 companies. In summarizing the field of foundry educational activities, he pointed to the need for a full time staff member to concentrate on education.

Officers elected by the division for the next two years are W. J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind., chairman, and William H. Ruten, Polytechnic Institute of Brooklyn, vice-chairman.

During a discussion of the Educational Division report, it was brought out that while the chapters are encouraged to conduct local apprentice contests on a new-man-in-industry basis, the AFS Apprentice Contest Committee requires that local winners whose entries are submitted for national judging be bona fide apprentices as outlined in contest regulations.

Gray Iron Division. W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va., retiring chairman of the Gray Iron Division, stated that the program and Papers Committee accepted about 75 per cent of the papers submitted for presentation at the 1953 Convention. He called attention to the joint session on sand reclamation sponsored in conjunction with the Sand and Steel Divisions, and the symposium on heat treatment of gray iron. The Chill Test Committee, he said is altering patterns and core boxes which will be distributed to committee members for study of the influence of section size and composition under plant conditions.

During the year, the Gating & Risering Committee completed work on the illustrated terminology chart RECOMMENDATIONS NAMES FOR GATES AND RISERS, which was published early in 1953. The committees on High Temperature Properties of Cast Iron and on Inoculation have been on a standby basis during the past year. The Microstructure of Cast Iron Committee has prepared a paper on metallographic procedures for gray cast iron and is assembling material which eventually will be used in the classification of spheroidal graphite.

Work of the Welding Committee has

Frank S. Brewster (left)

H. J. Rowe (right)

W. S. Pellini (left)

H. Bornstein (right)

resulted in acceptance by the American Welding Society of *"Recommended Practice for Welding of Cast Iron Pipe, Valves, and Fittings."* Current work under direction of the Research Committee, Mr. Levi reported, is expected to establish the effect of pouring temperature, metal composition, gases, inoculation, and other factors which influence the shrinkage and feeding characteristics of gray iron.

Unanimously elected chairman and vice-chairman, respectively, of the Gray Iron Division were J. S. Vanick, International Nickel Co., New York, and C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala. Election was held during the division's annual business meeting at the 1953 Convention.

Malleable Division. Annual report on the Malleable Division's activities for 1952-53 was presented by W. D. McMillan, International Harvester Co., Chicago, retiring chairman. One Convention paper was withdrawn subsequent to preprinting and prior to presentation, he stated. Mr. Massari followed up the point by stressing the importance of having authors of Convention papers fill in and sign an Offer of Technical Paper form. He also emphasized the need for authors to get company authorization for publication of papers, failure to do so being the reason for late withdrawal of the paper mentioned by Mr. McMillan.

Research sponsored by the Malleable Division on the effect of melting furnace atmosphere on casting and annealability has been successful and will be of a value to the malleable industry, the retiring division chairman declared. He announced new officers elected for the division as Milton Tilley, National Malleable & Steel Casting Co., Cleveland, chairman, and Frank B. Rote, Albion Malleable Iron Co., Albion, Mich., vice-chairman.

Pattern Division. New committees and new members are expected to develop pattern activities more broadly, said E. T. Kindt, Kindt-Collins Co., Cleveland, in presenting the first part of the Pattern Division report. The PATTERNMAKER'S MANUAL gave the pattern industry a shot in the arm, he asserted, and suggested that there is a need for a manual on metal patterns and shell mold patterns.

J. W. Costello, American Hoist & Derrick Co., St. Paul, Minn., reported on this year's successful pattern sessions staged during the 1953 Convention. A Pattern Round Table Luncheon and two or three technical papers, are planned for the 1954 Convention, he said. He expressed the hope that recorders for pattern sessions might be provided in the future.

Following a discussion which brought out the difficulties stenotypists have with foundry terminology and in securing the names of discussors, the committee voted to request AFS Headquarters to provide tape recorders as needed at the 1954 Convention.

Officers of the Pattern Division elected during the recent Convention are: chairman, E. T. Kindt; first vice-chairman, J. W. Costello, and second vice-chairman, Harry J. Jacobson, Industrial Pattern Works, Chicago.

Sand Division. Clyde A. Sanders, American Colloid Co., Chicago, retiring chairman of the Sand Division, stated, in reviewing division activities for the past year, that representation from geographical areas previously not included in the Sand Division was being developed. The division is now undergoing a consolidation to coordinate activities of its committee and subcommittee.

Frank S. Brewster, Harry W. Dietert Co., Detroit, raised the question of a hypothetical problem in which an AFS committee discovered, on the basis of certain tests, that a proprietary material is unsatisfactory. Under these conditions, he asked, would AFS become a party to condemning the product? Mr. Massari stated that the Society would not, although it was brought out that AFS would not suppress facts or findings.

In publishing any report, it was stated, a product cannot be referred to by trade name, committees must be absolutely sure of their conclusions, and parties interested in a product on which a committee report might reflect unfavorably would have an opportunity to express opinions on the matter prior to publication of the report. Further, conclusions stated in a committee report would have to be qualified by stating specific conditions under which the material was tested.

Sand Division chairman and vice-chairman announced for the coming two years are: Mr. Brewster, and O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis.

Steel Division. In the absence of the retiring chairman, Clyde B. Jenni, General Steel Casting Co., Eddystone, Pa., George W. Johnson, Vanadium Corp. of America, presented the report of the Steel Division. Following a brief review of the division's 1953 Convention program, the report cited the work of the Research Committee on hot tearing. A test specimen has been designed which yields reproducible results, and the project is now being carried on as a cooperative effort in seven steel foundries. The Statistical Quality Control Committee concluded its work with the publication of the book STATISTICAL QUALITY CONTROL FOR FOUNDRIES, it was reported, and the committee has been discharged with thanks.

Announced as division officers for the coming two years were: chairman, Mr. Johnson and, vice-chairman, Gordon L. McMillin, General Steel Castings Co., Granite City, Ill.

Time Study and Methods Committee. Committee Chairman Milton T. Sell, Sterling Foundry Co., Wellington, Ohio, stated in his report that all preparatory work on the TIME-STUDY HANDBOOK had been completed except the redrawing of some charts. During the year, he said, the committee had handled a number of requests for advice received from foundries.

The committee would like to change its name to Industrial Engineering Committee, he said, and following a discussion the Technical Correlation Committee voted to endorse the change which will be submitted to the AFS Board of Directors for final approval,

continued on page 82

AFS Staff Changes Announced at Chicago

SEVERAL important changes in the national headquarters staff of AMERICAN FOUNDRYMEN'S SOCIETY were recently announced at the Chicago office.

Silvio C. Massari, Technical Director of the Society since 1946, resigned as of July 1 to accept a position as general manager, foundry division, Hansell-Elcock Co., Chicago, an important producer of gray iron castings for the machine tool industry.

Mr. Massari joined AFS after serving with the Army's Chicago Ordnance District. A graduate of M.I.T., he had previously served 17 years as chief metallurgist in charge of research, Association of Manufacturers of Chilled Car Wheels, Chicago. He was elected Technical Director of AFS in July, 1946, and brought a wide knowledge of metallurgical and engineering practice to the Society. Combining organizational ability, drive, and a comprehensive knowledge of the industry, with a thorough background in metals casting, Mr. Massari contributed importantly to the technical program of AFS in all its phases.

Hans J. Heine has joined the AFS staff with the title of Assistant Technical Director, and will act as Technical Director until further notice. He was born and educated in Germany, where he graduated in 1935 from the Berlin Institute of Technology with a B.S. in Mechanical Engineering, following with an M.S. in Metallurgical Engineering in 1938.

Mr. Heine came to the United States after graduation and was naturalized as an American citizen in 1942. From 1939-1943 he worked with Aluminum Company of America as metallurgist, gaining valuable laboratory and production experience in cast and rolled light metals. He was active in setting up standard plant practices, investigating new castings and alloys, in calculating charges, and sand testing.

In 1943, Mr. Heine enlisted in the Army Corps of Engineers, and served until 1946 with both Engineers and Ordnance in the Pacific theater. After discharge, he accepted a position with the Pittsburgh Equitable Meter Division, Rockwell Manufacturing Co., where he remained until joining AFS. Starting as plant metallurgist and foundry consultant, he became chief metallurgist and supervisor of chemical and metallurgical laboratories in 1948. Since August, 1952, he has been chief metallurgist for both Pittsburgh Equitable Meter and the Barberton Divisions.

Mr. Heine speaks, reads and writes English, German and French fluently. He is a member of AFS, A.I.M.E., A.S.M., and other professional groups.

Harold J. Wheelock has been with AFS since March as Managing Editor, AMERICAN FOUNDRYMAN. He brings to the magazine a varied experience in the publication, editorial, and graphic arts fields. In addition, he has had trade association experience in Washington, D. C., following the war.

Mr. Wheelock, a graduate of the University of Southern California, Los Angeles, worked in public utility sales promotion and advertising before the war. As a Signal Corps officer, he served in radio in Africa and Europe, with 5 years of active duty.

He was managing editor, editorial research director, assistant advertising manager, and staff writer for 5 different magazines before joining AFS. Mr. Wheelock had also been a technical editor at the Jet Propulsion Laboratory, California Institute of Technology, and at Motorola, Inc.

Gregory J. Minogue has also been affiliated with AFS since March, in charge of production on AMERICAN FOUNDRYMAN. He has had valuable production experience on several publications in the Chicago area. Born and educated in Chicago, Mr. Minogue was associate editor, The Economist, Chicago, from 1935-40.

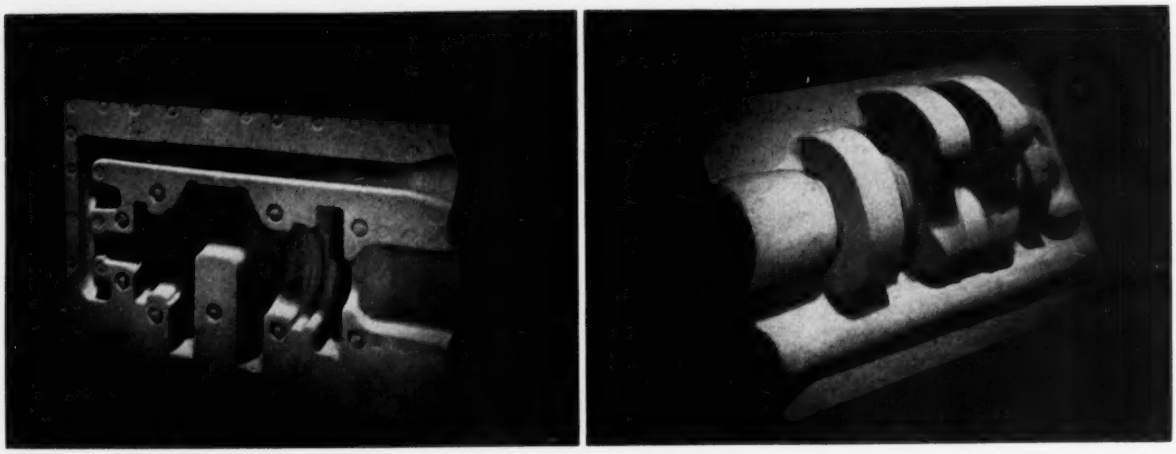
He served for four years in the Army Medical Administrative Corps, and was discharged as second lieutenant. He had experience in public relations and advertising in the fields of real estate and finance before becoming production manager, Chicago Journal of Commerce, a position which he held from 1946-51. Immediately before affiliating with AFS, Mr. Minogue was assistant production manager, Doremus & Co. advertising agency, Chicago.

S. C. Massari . . . to Hansell-Ellcock

H. J. Heine . . . Asst. Tech. Director

H. J. Wheelock . . . Managing Editor

G. J. Minogue . . . handles production



Two views of D-mold made at Auto Specialties Mfg. Co.

Dietert Process For Precision Molds

Since the Dietert or D-process for making precision molds was first mentioned during public discussion of papers at the recent A.F.S. Convention, American Foundryman has been asked repeatedly for details. The inventor, Harry W. Dietert, president, Harry W. Dietert Co., has provided them. Special binder for the D-process was developed by Archer-Daniels-Midland Co.; foundry adaptability of the method has been demonstrated by Wm. G. Ferrell, Auto Specialties Mfg. Co.

▪ The Dietert or D-process—latest precision molding method developed in the race of molding methods attempting to catch up with advances in metals and melting—consists of blowing a contoured core around a pattern to form one-half of a mold. It may be likened to a modified shell mold where thickness of the contoured core is controllable over a wide range to make it suitable for a wide range of metals and casting sizes.

The molding equipment required by this process consists of conventional equipment normally used in the foundry. Equipment required is a core sand mixer, core blower, pattern mounted on a blow plate, contoured dryers, core oven and one special piece of equipment to clamp and hold the two half-molds together during pouring.

Molding materials required are: (1) A silica or bank sand of A.F.S. fineness 90 to 150, and A.F.S. clay substance not exceeding 0.3 per cent; and (2) A special oil binder that cures fast, is very strong, imparts good green strength after ramming, does not require any water, has good bench life, has high blowability, and will not stick to cold pattern or hot contoured dryer.

Pattern equipment which has proved suitable for this new mold making method is illustrated on page 51. Since the mold is usually made with a core blower, the metal pattern is mounted on the blow plate complete with sprue, runner, ingate and header. The blow holes are spaced around the perimeter of the pattern approximately six inches apart. The ½-in. diameter vent holes with fine mesh screen are placed around the perimeter of the contoured shell ½ in. apart. Thus the core is vented around its outer edge and core sand enters around the outer edge of the pattern.

Metal dryers are cast and so constructed as to wrap around the pattern, leaving a small space between pattern and dryer for core sand of the desired thickness. For the smaller sized molds, a 3/16-in. thick core is satisfactory. A thickness of ¼ in. is used for medium-sized molds and 5/16-in. thick cores may be used for the larger molds.

The contoured cored mold can be made with a heavier cross-section at selected locations of the mold to withstand a heavy metal section. The contoured core may also be reinforced by ribs of sand. Only one pattern is required and it is machined to the desired accuracy, measurements being made at room temperature since the pattern is operated at room temperature. It may be bolted to the blow plate of the core blower, or it may be placed on the base of the core blower and the core blown through the dryer.

The contoured dryers can be of cast aluminum, gray

iron or other materials. The inside of the contour dryers does not require any machining, thus they may be cast in green sand and touched up with a file. The face of the dryer mating with the blow plate is machined or disc ground. When a rubber seal is used, this mating surface need not be in a perfect plane; a tolerance of $\pm$ 1/32 in. is allowable. The dryers should be ribbed for strength and the bottom of the dryer finished by machining or grinding.

The dried core sand is usually mixed with one to 2¼ per cent of Dietert Process binder for 15 minutes. Iron oxide or other extenders of core collapsibility can be used.

The mixed sand flows like dry sand but it is dustless. It possesses sufficient green strength in the sand chamber of the core blower so that it will not flow out of blow holes without air pressure.

Returned, hot, contoured dryers are placed on the bottom stripping plate of the core blower. Stop pins on the base plate of core blower locate the dryer so that pattern pins enter holes in the contoured dryer. The mixed sand blows easily into the restricted space, forming a densely rammed core on all pattern surfaces. The draft on the pattern can be as little as one-half degree. The stripping is clean and smooth without any sticking. The pattern is cleaned with alcohol or gasoline before starting and when the day's work is completed.

Baking Cycle

The contoured dryer with the blown core is placed in a conventional core oven with temperature ranging from 500 to 700 F. Baking cycle depends upon efficiency of oven, temperature, and size of core. Small cores have been baked completely in 12 minutes under best of conditions. Plant practice to-date on medium-size cores requires 30 minutes for baking.

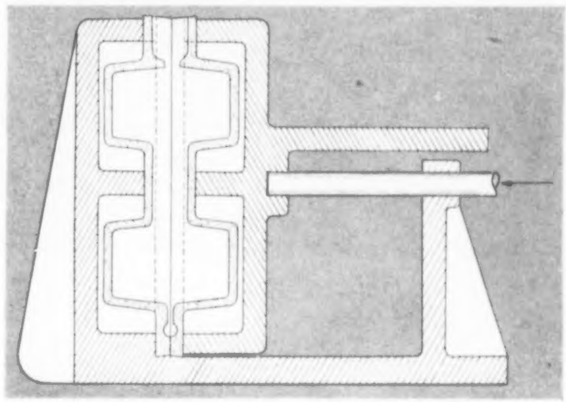
The hot core is removed by rapping the dryer and then lifting the core out of the dryer by hand. The hot dryer is then returned to the core blower. The hot core is completely cured and does not warp out of shape. Strength ranges from 500 to 600 psi. A photograph of a core is shown.

Both the mold side and outer surface of the core are smooth. The smooth outer surface allows for mechanical clamping and holding during pouring and metal cooling. Two of the cores are clamped together with a clamping device as illustrated. The core mold requires no wash for gray iron or steel.

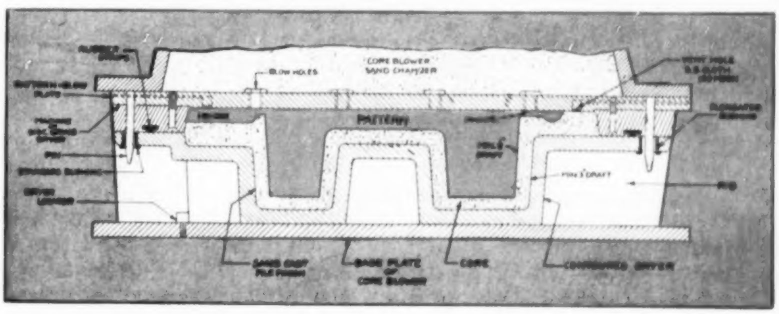
Casting finish and accuracy obtained with the D-process are comparable with those of the C-process. A photograph of a manifold casting made by the Dietert method at Dock Foundry Co. is shown above. This process may find its greatest field in the production of medium to heavy iron and steel castings.

The cost of the binder, per 100 pounds of core sand, is 50 cents. This, to date, does not indicate that it will prove to be more economical than green sand molding. It does, however, offer a possibility of improving the finish and accuracy of a new group of castings. As an example, making parts by casting which are now made by other methods. Indications are already at hand that the foundry, by using the Dietert process, has the opportunity of capturing a new, large tonnage of parts now made by drop forging.

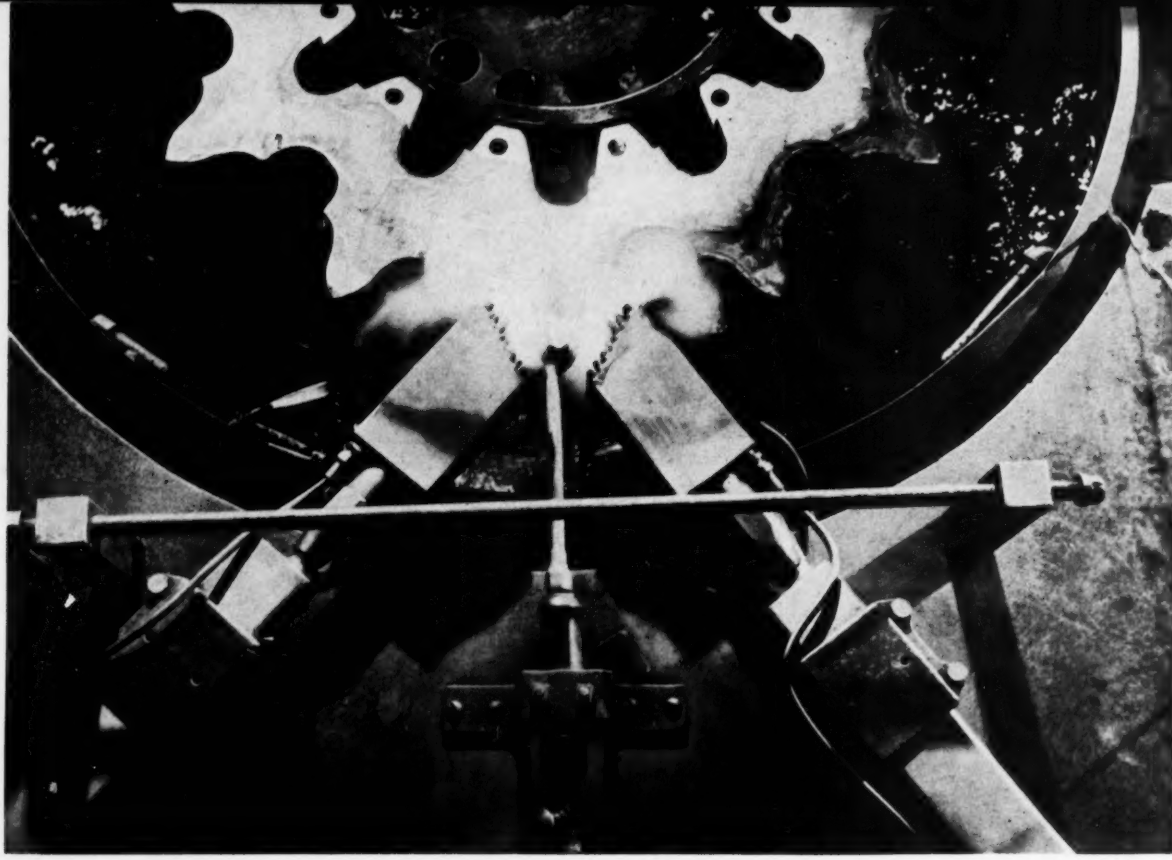
Manifold casting made in D-process mold at Dock Foundry.



Cross sectional view of clamping device for D-process.



Production principle of mold half for D-process mold, showing equipment, pattern, and dryer in cross section.



Overhead view of flame-hardening tank sprockets.

Flame Hardening of Cast Iron

M. R. Scott / *Detroit Flame Hardening Co., Detroit*

Flame hardening of cast iron is not new, but in recent years the tremendous amount of publicity given to the possible economic savings of welded structures has partially obscured some of the outstanding advantages of using cast iron. With the cost of fabricating steel structures advancing, the time has arrived for a competitive market to force every possible savings which can be realized without sacrifice of quality. Thus a review of flame hardening is in order for those who have forgotten that a very short time ago the entire machine tool industry relied upon cast iron and cast steel for machine bases, ways, gibs, and thousands of supplementary parts.

■ In the past 15 years the foundry industry has mechanized its equipment and quietly carried on a program of research and development which should now place it in a fine competitive position. Many of the new techniques applied to steel fabrication can, and some are, being used successfully in cast iron. One of these is the flame hardening process. The recurrent shortage of alloys has enabled the metallurgists to take advantage of, and coordinate, the inherent qualities of cast iron and flame hardening. Very real and substantial savings can result when a basically sound and practically applied process, such as flame hardening, is used with a full understanding of the results expected and attained.

Flame hardening consists of localized heating followed by quenching to provide a physical change in the surface of the metal. The limits of application of the process are wide and may be determined only by such practical aspects as availability of gases and manufacture of suitable equipment. The process offers wide diversification in the treatment of low, medium, and high carbon irons and steels. As in other hardening by heat treatment, the quench may be air, water, or oil.

Oxygen and acetylene are the two most commonly used gases because they produce the highest flame

temperature (approx. 6000 F) and a high rate of flame propagation. Many of the petroleum gases are used for flame hardening but they produce a lower flame temperature and consequently require longer heating periods. The economics of using petroleum gases combined with oxygen, or acetylene and oxygen, can probably best be determined by a study of the application for which they are intended.

Since it is necessary to use a highly oxidizing flame to secure the maximum flame temperature with petroleum types of gases, a decarburized skin will result on the surface of the part heated. On the other hand, the oxy-acetylene flame can be adjusted to provide either a neutral, oxidizing, or reducing flame without seriously affecting the flame temperature and therefore the rate of heating. Generally speaking, the oxy-acetylene flame can be used to greater advantage in the treating of cast iron, since the more rapid heating will produce a satisfactory depth of hardness with the minimum distortion.

Cast Iron Metallurgy in Brief

Gray iron constitutes by far the largest tonnage in the present foundry industry, therefore the comments in this paper will be directed toward gray iron, although they may also apply to the special irons now coming to the attention of metallurgists and design engineers.

Cast irons containing a considerable amount of graphitic carbon are known as gray cast irons because the appearance of their fracture is grayish or blackish and coarsely crystalline. Cast irons with all the carbon in the graphitic condition (no combined carbon) are extreme types, seldom produced, and not readily flame hardened. The structure of cast iron practically free from combined carbon consists of an iron or ferrite matrix in which are embedded many irregular and generally elongated curved plates of graphite (Fig. 1). These graphite plates break up the continuity of the metallic mass so effectively that the ductility and malleability of the iron is completely destroyed.

The brittleness of graphitic cast iron is not due to the proportion of graphite it contains but rather to the shape and dispersion of the graphite particles (Fig. 2). Conversely, when the graphite occurs in small rounded particles as in malleable or nodular irons the ferrite matrix may retain considerable ductility and malleability.

Cast iron has the facility of being able to withstand metal-to-metal wear primarily because of the embedded particles of graphite. However, the comparatively soft matrix offers little resistance to hard, foreign particles which may become wedged between sliding parts. When such a material is hardened, it is reasonable to expect that graphite particles embedded in martensite will provide a nearly perfect surface for wear resistance, superior to steel of equal hardness. Figure 3 illustrates the martensitic structure immediately below the surface of a flame hardened specimen.

Best Combined Carbon for Hardening

Most of the cast iron produced in this country contains both graphitic carbon and combined carbon, the latter in the range of 0.25 to 0.85 per cent. The factors affecting this distribution of carbon between the combined and graphitic states are: (1) Rate of cooling during and below solidification; (2) Presence of silicon, manganese, and sulphur. Silicon promotes the formation of graphitic carbon, while magnanese and sulphur oppose the formation of graphitic carbon.

Since gray iron may be considered as composed of a steel matrix in which numerous plates of graphite are embedded, it is possible, through suitable heat treat-

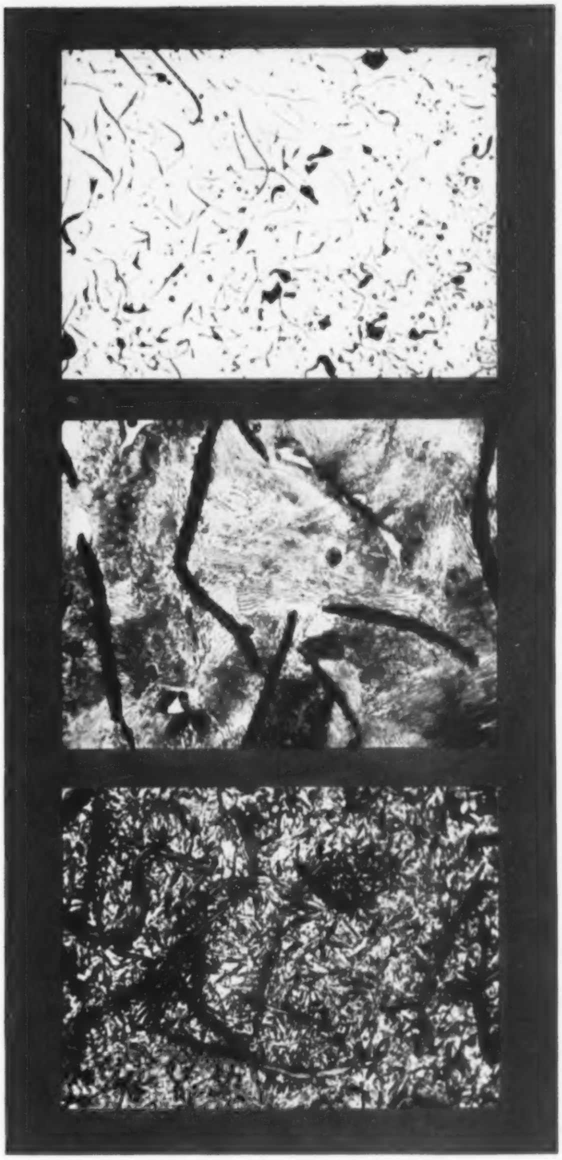
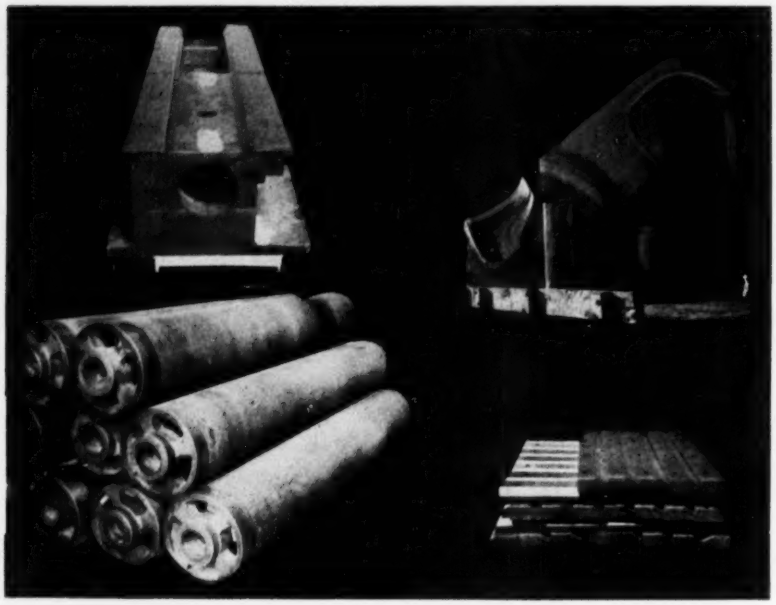


Fig. 1 (Top)—Unetched specimen, showing attitude of graphite dispersion. (X 500).

Fig. 2 (Center)—Structure of unhardened iron which is essentially all lamellar pearlite with small patches of ferrite. Etchant—1% Nital. (X 500).

Fig. 3 (Bottom)—Martensitic structure immediately below the flame hardened surface, showing stringers of graphite. Etchant—1% Nital. (X 500).



(Upper left): Typical cast iron die that has been flame hardened for longer life. (Lower left): Rolls cast soft, machined to final dimensions, then flame hardened. (Upper right): Full length cast iron ways as integral part of base. (Lower right): Ways cast sectionally.

ment, to greatly modify the physical properties of the iron. It is possible to produce a pearlitic or a martensitic matrix and secure softness or hardness in accordance with requirements.

Flame hardening can be successfully accomplished on cast irons not in the range of 0.25 to 0.85 per cent combined carbon, but such irons require special treatment and do not permit utilization of the process under optimum conditions. Unfortunately, the extremely rapid heating by oxy-acetylene flames provides a minimum of time for diffusion of carbon to form reasonably homogenous austenite prior to quenching. On the other hand, when the rapid heating is applied to cast iron of suitable analysis (CC 0.25 to 0.85) sufficient combined carbon exists to form a hard surface case of controllable depth. Since cast iron differs greatly from steel, some of the variables encountered in applying and testing the flame hardening process will be discussed.

Which Hardness Test to Use

The surface of cast iron that has been machined or ground contains tiny graphite pits susceptible to incipient fusion. Unless flame hardening is done with a thorough understanding of the process these pits may form hard spots that will be indicated by the testing equipment. Since cast iron differs from steel in this respect, the same types of tests will not prove suitable, and those who write the hardness specifications for cast iron must expect some latitude in the hardness range.

The degree of variation depends upon the type of testing equipment used. The most common error in this respect is in requiring a certain hardness reading on a Rockwell or diamond point tester. As a result, rejections occur in final acceptance of a part which should be entirely satisfactory from the standpoint of wear resistance. The most commonly used tests are the Brinell, the scleroscope, and the Rockwell. Each has its field of usefulness, but none is entirely satisfactory for the testing of a flame hardened cast iron surface. Figure 4 illustrates the type of indentation for the Brinell and Rockwell tests.

Brinell. The Brinell hardness number (Bhn) is calculated from the diameter of the impression left after a 10-mm diameter ball is pressed into the surface of the metal in not less than 6 seconds, and then held at the maximum load of 3000 kg for 30 seconds. The Brinell number is calculated as the load divided by the spherical area of the impression. The harder the metal, the smaller the indentation for a given load, and the higher the Bhn.

Variations that may occur with this method of testing are: (1) Surface hardness in excess of 500 Bhn may cause deformation of the ball with consequent erroneous readings; (2) The normal flame hardened depth of case will range from 0.030 to 0.120 in. of maximum hardness and the 10-mm ball may break through the case. From the practical aspect, the Brinell machine is not generally applicable because most cast iron parts are finished and the indentation mark may not be permissible. In addition, many cast iron parts, due to their size may not be placed in the Brinell machine.

Scleroscope. In this type of test, a diamond-tipped hammer is dropped from a definite height upon the surface to be tested, and the hardness is measured by the height of the rebound, the scale being graduated in arbitrary units. The depth of penetration is very small and the rebound is regulated more by the elastic limit of the specimen than by its tensile strength. Hence, the scleroscope does not measure the same type of hardness as do the indentation methods. Its disadvantages are the "anvil" effect when used on light sections, and the fact that it must be checked constantly against test blocks to insure its accuracy. However, its portability and the fact that it does not indent the surface of the iron deeply make it the most suitable for testing flame-hardened cast iron castings.

Rockwell. A rapid and highly regarded method for testing is the Rockwell C test which is similar to the

Vickers except that a diamond cone (120 degree) instead of a pyramid is used for the penetrator. In the Rockwell test, the penetrator is first seated by a small minor load, the dial set to zero, then the larger or major load (usually 150 kg) is applied for a specified time. When the major load is removed, the hardness number is read directly from the dial.

Application of the major load in the order of 150 kg causes variation in the readings. Figure 7 shows the type of variation that may occur when taking hardness readings at 1/8-in. intervals along a polished surface of flame hardened cast iron. It reveals that the A scale has less variation since the depth of the penetrator is less and should therefore be used instead of the Rockwell C scale. For Rockwell machines equipped with the 30N or Superficial scale (30 kg), the readings could be expected to be more accurate. However, when the latter scale is used, the surface tested must be highly polished to avoid errors created by grinding or machining marks.

Compare Rockwell and Scleroscope

Since the Rockwell tester is well known, and usually available, hardness is generally specified in one of its scales. However, the actual readings may be taken by scleroscope and converted to Rockwell but the variation in this conversion must be taken into consideration in testing cast iron. An example of this is illustrated in Fig. 5, which shows the variation in conversion from Rockwell C to scleroscope, and the actual scleroscope readings. It is believed that the actual scleroscope readings are more representative of the true measure of the surface hardness than Rockwell C. It is also noticeable that, the higher the hardness of the surface, the greater will be the variation between the two methods in conversion.

The problem of hardness testing cannot be discussed without mention of the practical and probably the most universally used method—file testing. While testing with a file cannot be accepted for high accuracy, in the hands of an experienced individual who understands testing and the metallurgy of cast iron, it can be a valuable aid in determining the physical characteristics of the part being tested.

Several file manufacturers supply hardness testing files in ranges equivalent to 35 to 65 R_c. This is a definite improvement over the single file method and may be useful in checking parts which cannot be tested by the usual methods.

How Deep You Should Harden

The depth of the flame hardened case is usually determined by the service to which the part may be subjected, but in the actual hardening process, it becomes a function of time, temperature, and quench and is both controllable and reproducible. The normal flame hardened case will be in the range of 0.030 to 0.120 in., although for special applications it may be increased to 0.250 in. or greater. In hardening cast iron to a specified depth, certain precautions must be observed if the surface condition is to be left in a perfect state for wear resistance.

It has been indicated that the ratio of oxygen and acetylene is variable within limits. Since depth of hardness is primarily a function of time at temperature, and the temperature of the oxy-acetylene flame is approximately 6000 F, it follows that cast iron may have some of the carbon burned from the surface if subjected to a neutral or oxidizing flame for a long period of time.

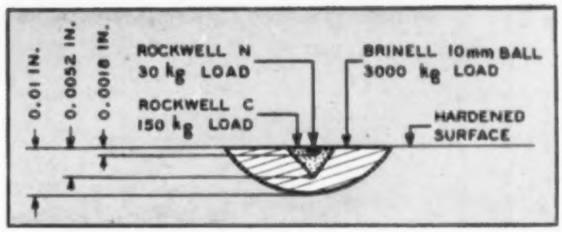


Fig. 4—Relative depths of Brinell, Rockwell C and Rockwell N hardness impressions.

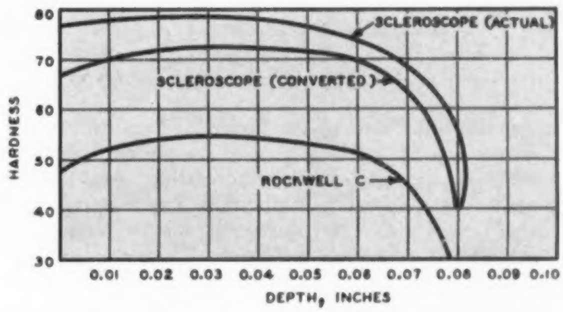


Fig. 5—Rockwell C—Converted vs. Actual Scleroscope.

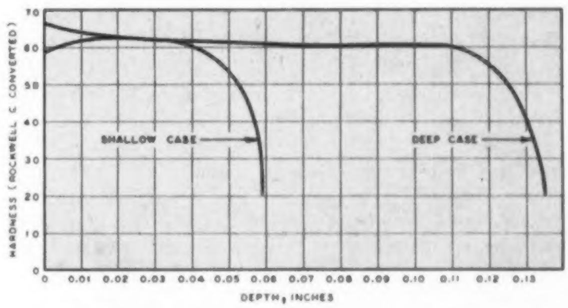


Fig. 6—Surface hardness—Deep vs. light case depth.

The normal type of hardness curve is illustrated in Fig. 6, which reveals a slightly lower surface hardness in a total case depth of 0.060 in. If this case depth were extended to 0.125 in., and the neutral or oxidizing flame adjustment maintained, the depth of decarburization would be increased, since the carbon would be burned from the surface more rapidly than it could be combined from graphitic carbon in the matrix.

Or the oxy-acetylene flame may be adjusted to provide a reducing atmosphere and thereby protect the iron surface from decarburization. In fact, some evidence exists to prove that the surface carbon may be increased somewhat though the time at temperature is short. The probability exists that there is sufficient time to convert a higher percentage of graphitic carbon to combined carbon. The top curve in Fig. 6 reveals this condition of high surface hardness combined with greater depth when subjected to a slightly

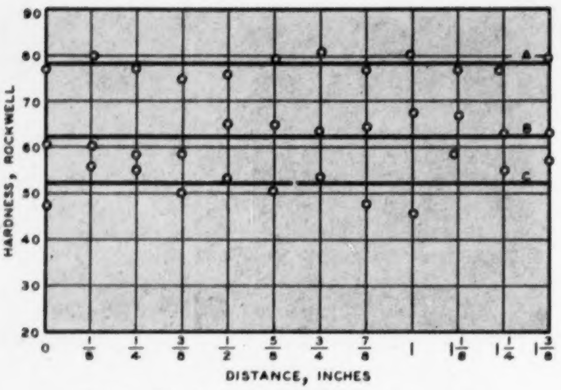


Fig. 7—Variations in Rockwell A, B and C.

reducing flame during the hardening operation.

Further practical aspects may dictate the depth of case to be specified. Unless the casting is sufficiently massive, or the part to be hardened is properly confined, a heavy case depth may cause distortion well beyond manufacturing tolerences. The optimum case depth of 0.030 to 0.120 in. will produce the minimum distortion combined with suitable hardness.

Where Flame Hardening is Used

With the knowledge and experience of so few years, it is impossible to describe or predict the extent to which flame hardening can be utilized by the iron industry. However, it seems reasonable to assume that in the near future it may become far more important than even the most optimistic metallurgists care to predict. The initial experiments of several companies some 12 to 15 years ago, in flame hardening machine ways, has become the accepted practice of today. This field seems unlimited and its growth will depend upon the ability of the foundry industry to point out the advantages of using cast iron when combined with suitable design features for various types of machines.

The versatility of the flame hardening process lends itself to the machine tool industry, which must provide surface protection for parts which may be curved or straight, light or heavy, and cannot be economically hardened by other methods.

All industry is crowded with possibilities for use of this adaptable process and the design engineers who fully understand flame hardening agree that it can be a tremendous aid to the foundry industry in securing acceptance of castings in new fields. It may be worthwhile to illustrate a few of relatively new applications.

It has been common practice for the industry to produce chilled rolls for the paper, steel, and allied industries. This method produces a fine roll with a hardened surface created by pouring into suitable molds. These rolls accelerate the cooling of the roll surface and thereby provide a fairly high hardness. Most rolls must have a very smooth surface and quite often the chilled roll has enough hardness to prevent final sizing by machining. The result is reliance upon grinding.

There is sufficient evidence to prove that some types of rolls could be produced more cheaply, without sacrifice of quality, by casting the roll in soft condition, machining to final dimensions, and flame hardening. Page 54 illustrates cast iron rolls produced by this method.

Both the foundry and the machine tool industries are cooperating in providing machines with cast iron bases and flame hardened ways. However, to date, only a few have recognized that further savings can be achieved by casting the ways as an integral part of the base. Obviously, there are cases when this is impossible and a choice then lies between casting sectional or full length ways. In either case, it is possible to machine the ways to very close tolerences, flame harden, and then finish grind. Both types of fabrication are illustrated.

Die Life

One of the first uses of flame hardening in cast iron was to increase the life of dies used in forming steel. While this use has continued, it has never been promoted because of the inability of most heat treating shops to handle large dies. With the threat of plastic dies, and in the face of the continuing shortage of alloys, it is well for the foundry industry to evaluate the use of flame hardening in conjunction with lower-cost cast iron to provide dies applicable to the automotive and appliance industries.

The initial cost of a die is usually extremely high, and any process that will increase its productive life many times warrants study and application. Normally, the wear on dies is confined to a relatively small area of the surface and, if this area is hardened, the entire die life is entended. The sizes and shapes of dies vary considerably but the flame hardening process is adaptable to the small or large die with equal facility. Some of the cast iron dies used in the automotive and appliance industries that have been flame hardened for longer life are shown.

Conclusions

1. Cast irons covering a wide range of chemical analyses can be successfully flame hardened.

2. The desirable range of combined carbon in gray iron to be flame hardened is from 0.25 to 0.85 per cent.

3. Cast irons that do not contain combined carbon in the range of 0.25 to 0.85 per cent can be flame hardened if subjected to suitable treatment.

4. The hardness gradient found in flame hardened cast iron is sharper than that found in flame hardened steel.

5. In general, the oxy-acetylene flame is the most suitable gas combination for flame hardening.

6. The Shore scleroscope hardness tester is the most satisfactory method for testing flame hardened cast iron although it has limitations.

7. Scleroscope readings converted to Rockwell readings will be more accurate than direct Rockwell readings.

8. The Brinell is not a satisfactory method for testing the average flame hardened case.

9. The depth of case and the surface condition of flame hardened cast irons are controllable.

10. The flame hardening process is applicable to practically all gray iron castings that require selected areas to be protected from wear.

Foundries CAN Be Safe

That foundries can establish and maintain safety records that compare favorably with industry as a whole was demonstrated at the Greater Chicago Safety Conference, held June 2-4.

Allied Steel Castings Co. was presented an award for reducing its accident frequency rate from 54 to 20.8 during the past year, graphic proof that an intelligent and cooperative approach to safety will yield quick results.

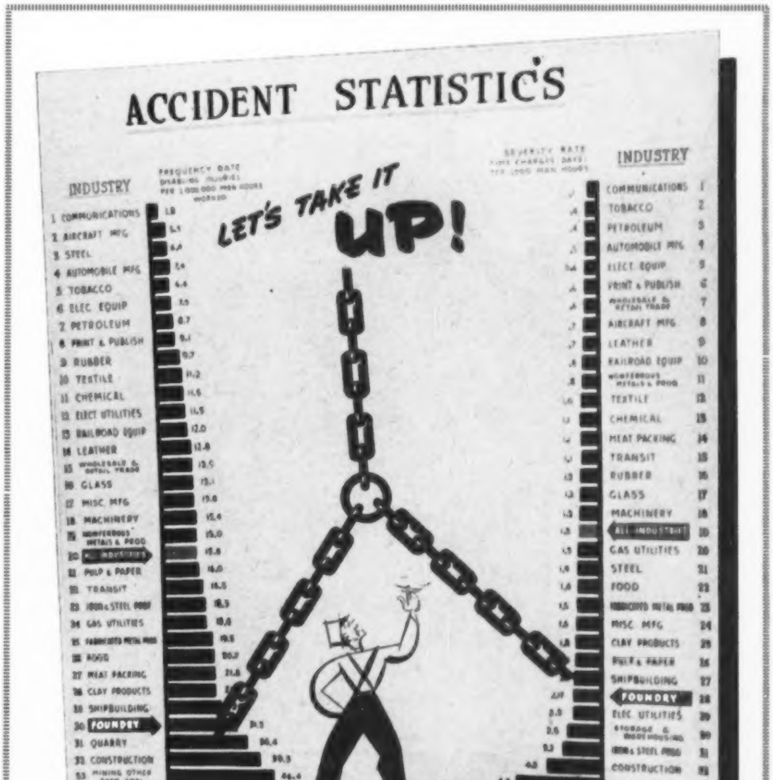
No Lost Time

At the same conference, Melrose Park plant, Brake Shoe Castings Division, American Brake Shoe Co., received an award for having reduced the number of lost-time accidents from 10, with a loss of 94 days in 1951, to 3 accidents and 23 lost days in 1952. The brass foundry plant, National Bearing Division, American Brake Shoe Co., also won an award for an outstanding safety record.

Awards were also presented recently to foundries in other parts of the country. Grede Foundry, South Water Division, Milwaukee, did not have a lost-time accident during the last 6 months of 1952. Hughes Tool Co., Houston, Texas, has just completed five successive years of accident-free operation!

The following foundries have established exceptionally low lost-time accident frequency ratings during the past year:

Foundry	Rating
Mackintosh-Hemphill Co., Midland, Pa. (rating also under 10.0 in 1950-51)	**1.6**
General Steel Castings Corp., Eddystone, Pa. (rating also under 10.0 in 1950-51)	**3.7**
General Steel Castings Corp., Granite City, Ill. (rating also under 10.0 in 1950-51)	**3.8**
Chapman Valve Mfg. Co., Indian Orchard, Mass. (rating also under 10.0 in 1950-51)	**7.9**
Sumner Iron Works, Everett, Wash.	**7.9**
Crucible Steel Castings Co., Cleveland	**8.6**
Symington-Gould Corp., Depew, N. Y.	**8.9**
American Steel Foundries, Granite City, Ill. (rating also under 10.0 in 1950-51)	**8.9**
Massillon Steel Castings Co., Massillon, Ohio	**9.3**



This chart is based upon recent figures released by the Bureau of Labor Statistics, U. S. Department of Labor. Bars on the left indicate accident frequency rate per million man-hours of work. Those on right show the severity rate of accidents per man-hour. According to these data, the foundry industry as a group does not compare well on either basis. A strong and concerted effort is necessary to bring the foundry rates up higher on safety charts.

Safety on Display

A few cast-off materials and a lot of ingenuity and co-operation can present the safety lesson with maximum impact. Here is how one foundry has dramatized its safety campaign with three-dimensional exhibits that greatly increase attention-getting and memory value.

AMERICAN Steel Foundries' East St. Louis works has been conducting a unique, 10-week program designed to impose the safety idea with dramatic impact. Under the general supervision of L. C. Farquhar, works manager, a series of king size displays were installed near the plant cafeteria, with a change each week, to insure continued interest.

Serving to remind the personnel of the safety practices in which they had all been previously schooled, the exhibits were developed by a committee composed of the safety supervisor, yard master, and personnel supervisor. Fabrication was performed by plant personnel and drew many favorable comments.

One display utilized a pair of crutches 10 ft in height to command attention. Another used a pair of 3 ft dice constructed of wood and painted white with round black spots.

Two hands were made from ¾-in. plywood and painted flesh color for another of the series. The accompanying sign pointed up the fingers as the worker's best tools.

A plaster head was acquired after it had been discarded by a local firm. It was patched and repainted for use. In another setting an exact replica of a telescope was constructed on a tripod. When looked into, nothing was seen but blackness, emphasizing the motif for the week.

Three-foot Goggles

A pair of goggles 3 ft in diameter were fabricated in true proportion to the type used by employees in the plant. In order to carry out the theme of another exhibit, a multi-colored container, shown on opposite page, was built with a mirror inside. When the employee looked into the barrel, he saw his own reflection.

A realistic, colored snake 17 ft long was made from a discarded fire hose, with metal rings for the rattlers. The head was made from a piece of wood, and was provided with tongue and fangs. Brightly painted plants were used for shrubbery in this display.

Considerable ingenuity was shown in the construction of the ninth project. A mouse trap, measuring 4 ft x 8 ft, was made from a piece of plywood. Springs and rods were built from waste materials and painted aluminum. A block of wood with drilled holes was used for the cheese. The mouse was about 2½ ft high and held a bamboo stick, with which he fished for the cheese.

Last of the exhibits was made from a used window frame, a sheet of plexiglass, and the word 'Safety" split apart with half of the letters bolted on each side of the plexiglass.


DON'T THROW SAFETY
OUT THE WINDOW
SAFETY
DON'T
GAMBLE
with Safety
Our Best
Safety EQUIPMENT
IS OUR HEAD
THERE'S A SAFE WAY
FOR EVERY
JOB
If you don't know ASK!
TAKE A LOOK!
INSIDE
SEE IF YOU CAN FIND
A SAFE WORKER
Wear Your Goggles
ARE YOUR FINGERS
WORK SAFELY
LAST PAIR of EYES
TAKE A LOOK!
SEE WHAT THE
BLINDMAN SAW
Wear Your Goggles

★ Convention Paper

The Influence of Molding Materials on Hot Tearing—Part II

J. M. Middleton / *Research Officer, British Steel Castings Research Assn.*

This paper was presented at the 57th Annual Meeting, American Foundrymen's Society, in Chicago. Printed in two parts in AMERICAN FOUNDRYMAN, the first of which appeared in the June issue, the paper is concluded herewith.

As the grain size of the sand is increased so is the hindrance to contraction offered by the compact and the amount of load induced in the casting. For example, 75 sec after pouring the loads induced in the castings by the different compacts are:

Fine sand	17 lb
Medium sand	26 lb
Coarse sand (Density 1.52 g/cc)	40 lb
Coarse sand (Density 1.55 g/cc)	55 lb

It is known that as the grain size of the sand increases so does the sintering point of the compact, and therefore its hot strength. These in turn increase the hindrance to the contraction of the casting that is offered by the compact.

Photographs of sections taken from the castings showing the extent of tearing with the four mixes are shown in Figs. 16, 17, 18, and 19. Tearing is most severe in the casting held by the higher density coarse sand, and becomes less severe as the grain size of the sand is reduced. The difference in the extent of tearing with the coarse and fine sands compacts is not so great as would be expected when the loads induced in the casting during the hot-tearing range are compared.

Increased Load

It will be noted, for example, that 75 sec after pouring the casting held by the coarse sand is under a load three times as great as that in the casting held by the fine-sand compact. A possible explanation for this is that a) lower metal/mold interface temperatures are associated with coarse-sand compacts than with fine-sand compacts under identical conditions, and b) coarse-sand compacts have higher thermal conductivities than fine-sand compacts.

The inclusion of a coarse sand test block will therefore result in lower temperatures and faster rates of

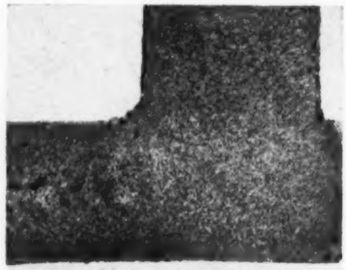


Fig. 16 — Tear in casting restrained by a test block of fine sand mixture.

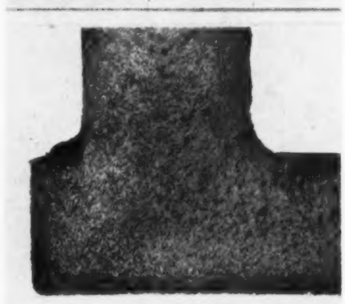


Fig. 17 — Tear in casting restrained by a test block of medium sand mixture.

cooling than with a fine-sand compact, and the hot spot in the casting should be less intense and the development of strength in the casting should be more uniform, with a resultant lessening in the likelihood of tearing.

A coarse-sand compact, therefore, influences the contraction of the casting in two ways:

a) By reason of its high hot strength, it increases the hindrance to contraction and thereby makes tearing more probable.

b) It flattens the temperature gradients in the casting (i.e., it acts as a chill) and diminishes the possibility of tearing.

Effect of Different Bonds

Tests were carried out on test blocks containing different clay and organic bonds, and the loads induced in the castings at periods of 55, 75 and 105 sec

after pouring are shown in Fig. 20, together with a curve showing the extent of tearing associated with each bond.

The test blocks bonded with clay binders were made of Arnolds 26A sand, while those containing organic bonds were made of Chelford medium sand. All blocks were tested in the dry condition, and details of moisture content, density, etc., are given in Table 4.

The results show that the higher loads due to hindrance to contraction are associated with castings held by the test blocks containing organic binders (phenol resins, linseed oil and semi-solid), this being specially so at times of 75 and 105 sec after pouring.

With clay binders the highest loads are induced with test blocks containing fireclay and silica-flour additions, and the lowest loads with those containing ball clay, bentonite and bentonite plus iron oxide. A naturally bonded sand had low resistance to contraction. The addition of a cereal binder to a bentonite-bonded sand had little effect.

Determination of strengths of molding materials at elevated temperatures[5] have shown that mixes containing fireclays and silica flour additions have higher strengths than those containing bentonite, especially at the temperatures attained near the casting interface, that is, above 1300 C (2372 F).

Of the organic bonds, the highest hinderance to contraction was offered by the test blocks containing 2 pct linseed oil, and the lowest with the block containing 1.25 pct urea resin. The results confirm that sands bonded with urea resins collapse more readily than sands bonded with phenol resins, the phenol-resin-bonded sand having similar collapsibility to one containing 1.5 pct linseed oil.

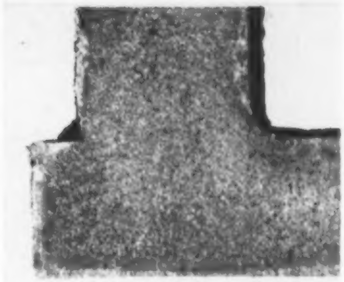


Fig. 18 — Tear in casting restrained by a test block of coarse sand rammed to a density of 1.52 g/cc.

Fig. 19 — Tear in casting restrained by a test block of coarse sand rammed to a density of 1.55 g/cc.

TABLE 4

Bond	Moisture, %	Density g/cc	Load for Compaction, psi	Dry Comp. Strength, psi
Arnolds 26A Sand				
1.5% Bentonite	3.0	1.45	231.0	64.0
5.0% Bentonite	5.0	1.52	118.0	170.8
10.0% Bentonite	5.6	1.45	42.2	111.0
5.0% Bentonite + 1.0% Cereal Binder	5.2	1.52	115.0	254.0
5.0% Bentonite + 5.0% Fe_2O_3	4.7	1.52	71.0	140.0
5.0% Western Mediterranean Bentonite	4.6	1.52	184.0	105.0
5.0% Fullers Earth	4.9	1.45	50.7	71.0
7.5% Secondary Mica Clay	4.2	1.45	57.0	63.2
7.5% China Clay	3.5	1.52	52.8	34.4
7.5% Ball Clay + 2.0 % Bentonite	4.4	1.52	59.0	111.0
7.5% Fireclay	3.3	1.52	112.0	44.0
20.0% Silica Flour + 5.0% Bentonite	5.1	1.52	93.0	170.0
Naturally Bonded Sand	6.6	1.72	30.0	241.0
Chelford Sand				
1.25% Phenol Resin 2.0% Cereal Binder 0.5% Parting	3.0	1.64	78.0	700.0
1.25% Urea Resin 2.0% Cereal Binder 0.5% Parting	3.0	1.64	57.0	825.0
1.5% Linseed Oil + 1.5% Cereal Binder	2.5	1.60	72.0	1442.0
2.0% Linseed Oil + 1.5% Cereal Binder	2.5	1.60	94.8	1810.0
1.5% Linseed Oil + 1.5% Cereal Binder + 1.5% Bentonite	2.5	1.60	103.0	485.0
4.0% Semi-Solid		1.58	134.0	1060.0

The addition of a clay (1.5 pct bentonite) to a linseed oil mix reduces the media's ability to resist contraction. This is at variance with published work,[6] which suggests that clay additions to organic binders increase the compact's time of collapsibility at 1371 C (2500 F).

The extent of the tears in the castings restrained with the blocks bonded with clays is small, being of the order of 2 mm for the majority, and increasing to 4-5 mm with fireclay and silica-flour additions.

Large tears, however, are associated with the castings restrained by the blocks containing organic binders (except in the case of the urea-bonded sand), the casting restrained with the block containing 2 pct linseed oil being almost completely severed. Typical examples of the extent of tearing with various bonds are shown in Figs. 21, 22, 23 and 24.

Effect of Linseed Oil Variations

Since severe tearing was encountered in castings restrained with test blocks bonded with linseed oil, a number of tests were made to determine the effect of variations in the amount of linseed oil addition. The castings were restrained by test blocks of similar density but containing linseed oil additions of from 0.75 to 2.0 pct. The loads induced in the casting 55 and 75 sec after pouring and the amount of tearing associated with each mix are shown in Fig. 25, and details of compressive strength, etc. are given in Table 5.

An increase in the amount of linseed oil from 0.75 to 1.0 pct causes higher loads to be induced in the casting; a further increase of linseed oil from 1 to 1.5

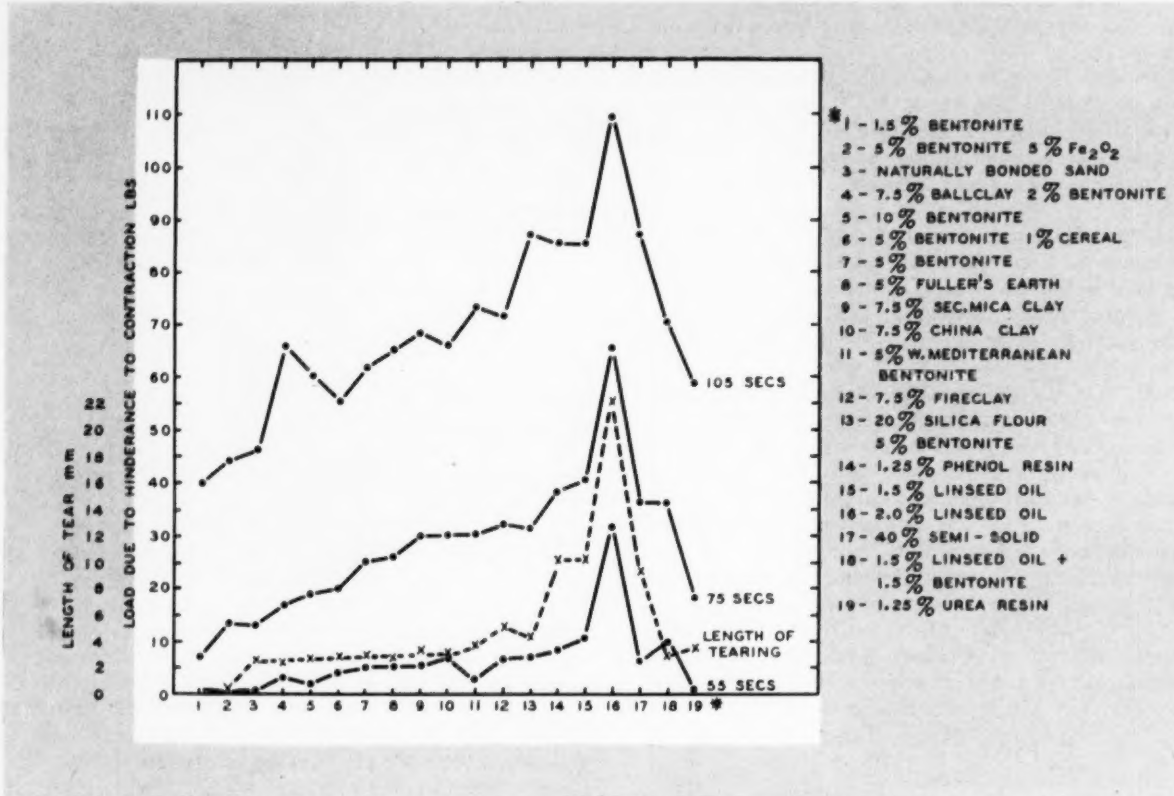


Figure 20

pct has little effect, but additions of 2 pct increase the amount of load considerably. Dietert[6] has shown that as the linseed oil/sand ratio becomes greater, so the sand collapses more readily at elevated temperatures.

As would be expected, the curve showing the extent of tearing associated with each linseed-oil mix takes a similar form to that of the load curves. Photographs of casting sections showing the extent of tearing with each linseed oil content are shown in Figs. 26, 27, 28 and 29.

Effect of Variations in Casting Temperature

In all the tests previously described the casting temperature was held constant at 1575 C (2867 F) to ensure that any differences in hindrance to contraction and the incidence of tearing were due solely to the nature of the molding material. Variation in casting temperature should, however, alter the temperature conditions in the test block and casting, and should therefore affect the amounts of hindrance to contraction operating while the steel is in the hot-tearing range.

To ascertain the effect of variation in casting temperature a series of tests were carried out using test blocks bonded with:

a) 5 pct bentonite. (Moisture, 4.8 pct; density, 1.52 g/cc; dry compression strength, 170.8 psi.)
b) 5 pct bentonite + 20 pct silica flour. (Moisture, 4.4 pct; density, 1.51 g/cc; dry compression strength, 120 psi.)
c) 1.5 pct linseed oil + 1.5 pct cereal binder. (Moisture, 2.5 pct; density, 1.60 g/cc; dry compression strength, 1442.0 psi.)

Different Temperature for Silica

Casting temperatures of 1525, 1575 and 1625 C (2777, 2867 and 2957 F) were used, except in the case of the mix containing 20 pct silica flour for which casting temperatures of 1575 and 1625 F (2867 and 2957 F) only were employed.

Curves in which the load due to hindrance to contraction is plotted against time after pouring for the linseed oil and silica flour mixes at the different casting temperatures are shown in Fig. 30.

Similar trends of load/time with casting temperatures were obtained with the 5 pct bentonite mix. The curves show that as the casting temperature becomes lower so the load induced in the casting at

TABLE 5

Bond	Moisture, %	Density g/cc	Load for Compaction, psi	Dry Comp. Strength, psi
0.75% Linseed Oil 1.5% Cereal Binder	2.5	1.60	200.0	1110.0
1.0% Linseed Oil 1.5% Cereal Binder	2.5	1.61	219.0	1170.0
1.5% Linseed Oil 1.5% Cereal Binder	2.5	1.61	108.0	1442.0
2.0% Linseed Oil 1.5% Cereal Binder	2.5	1.61	94.8	1810.0

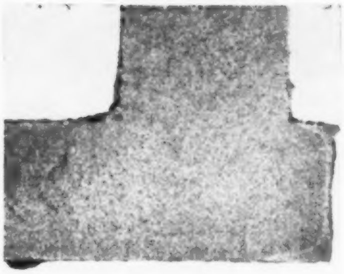


Fig. 21—Section of casting showing the amount of tear induced by test block made from naturally bonded sand.

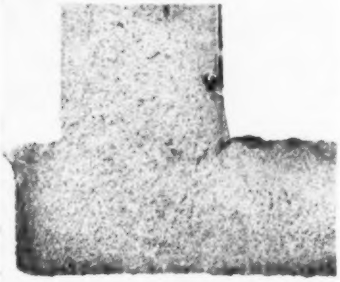


Fig. 22—Section of casting showing tear induced by test block bonded with 7.5 pct fireclay.

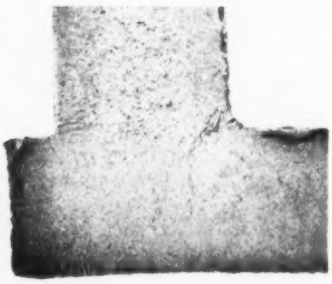


Fig. 23—Section of casting showing the amount of tear induced by test block bonded with 1.25 pct phenol resin.

Fig. 24—Section of casting showing tear induced by test block bonded with 2 pct linseed oil.

any time after pouring becomes greater. For example, 75 sec after pouring a casting held by a test block containing 1.5 pct linseed oil bears a load of 30 lb when poured at 1625 C (2957 F), 40 lb when poured at 1575 C (2867 F), and 76 lb when poured at 1525 C (2777 F). This trend is due to two factors:

1) With lower casting temperatures the temperatures attained in the test block will be correspondingly lower, and therefore the molding material will have higher strength and slower collapsibility, thus being capable of resisting the contraction of the casting to a greater degree.
2) Low casting temperatures make for rapid solidification of the casting and higher rates of solid contraction, thereby making stress development in the casting more rapid.

As the casting poured with the lower superheat is

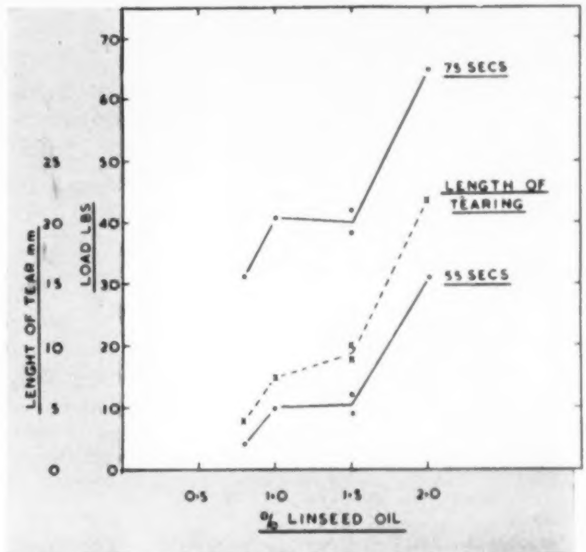


Figure 25

the one most highly stressed, it would be expected to contain the largest tears. This was not found to be so, as is evidenced by the sections shown in Figs. 31, 32 and 33.

The tearing is most severe in the casting poured at the highest casting temperature, namely, at 1625 C (2957 F), and becomes less severe as the casting temperature is lowered. This means that test blocks bonded with 1.5 pct linseed oil have slow collapsibility, even when the temperatures in the test block are accentuated by the use of the higher casting temperature. The extent of tearing in the casting will, therefore, depend upon the relative amounts of comparatively strong (cool) steel and comparatively weak (hot) steel.

Low casting temperatures favor a more uniform solidification rate throughout the casting so that strength development is uniform. With higher casting temperatures the temperature gradients in the casting are steeper and one portion of the casting (i.e., the bar) will have undergone considerable solid contraction, while the other portion (i.e., the runner portion) will be hot enough to be very weak.

A low casting temperature will also ensure the rapid formation of a solid skin on pouring which is able to resist the contraction stresses. The range of casting temperatures (1525-1625 C) (2777-2957 F) chosen for this investigation is that usually encountered in practice; it is possible that with still higher casting temperatures more rapid collapse of the linseed-oil-bonded sand may occur and thereby make tearing less severe.

Less Influence

With the other sand mixes the influence of casting temperature on tearing is much less marked. Figures 34, 35 and 36 show sections taken from castings held with the test blocks bonded with 5 pct bentonite and cast at 1525, 1575 and 1625 C (2777, 2867 and 2957 F), and Figs. 37 and 38 show sections held

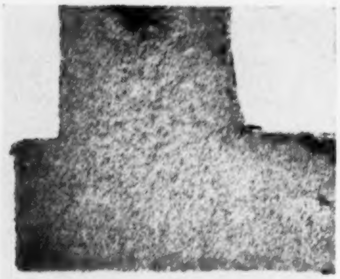


Fig. 26 — Tear in casting restrained by test block bonded with 0.75 pct linseed oil content.

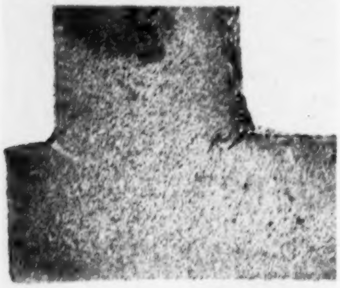


Fig. 27 — Tear in casting restrained by test block bonded with 1.0 pct linseed oil content.

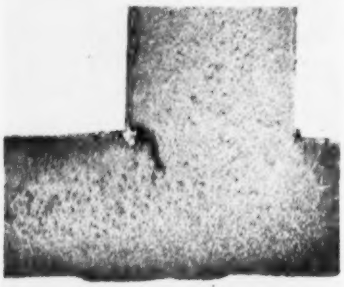


Fig. 28 — Tear in casting restrained by test block bonded with 1.5 pct linseed oil content.

Fig. 29 — Tear in casting restrained by test block bonded with 2.0 pct linseed oil content.

by test blocks containing 20 pct silica flour and cast at 1575 and 1625 C (2867 and 2957 F).

The effect of increasing the casting temperature from 1575 to 1625 C (2867 to 2957 F) using test blocks containing 20 pct silica flour is slightly to increase the extent of tearing. With test blocks bonded solely with 5 pct bentonite, tearing is associated only with the casting poured at 1575 C (2867 F), the castings poured at 1525 and 1625 C (2777 and 2957 F) being relatively free from tears.

The differences in behavior with variations in casting temperature between the clay and linseed-oil-bonded sands is probably due to the retention of strength properties of linseed-oil-bonded sands with increasing temperatures as opposed to a lowering of strength properties of sands containing clays and silica flour with increasing temperature. This will

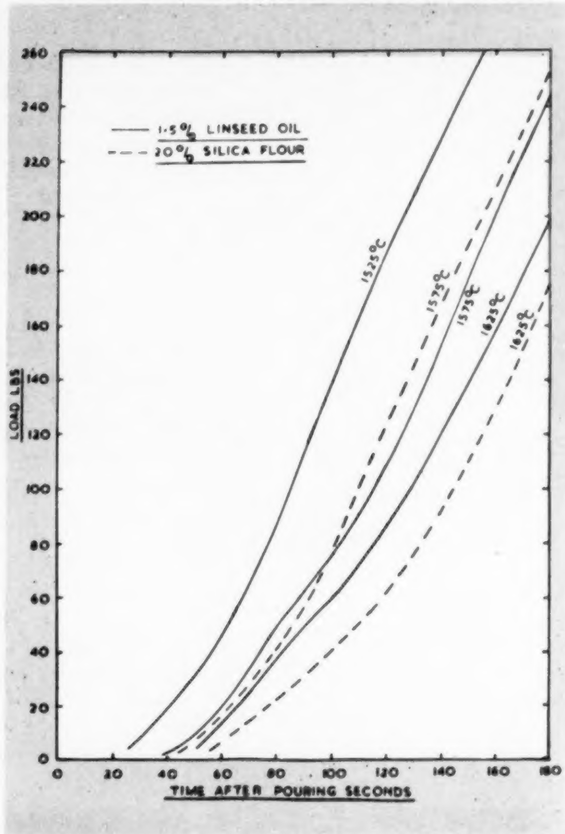


Figure 30

cause the linseed-oil compacts to offer higher resistance to contraction to the casting with higher casting temperatures.

The load curves in Fig. 30 confirm this view: at a pouring temperature of 1625 C (2957 F) and 75 sec after pouring, the loads induced in the casting held by the blocks containing 1.5 pct linseed oil and 20 pct silica flour are 30 and 17 lb, respectively.

Conclusions

In this investigation the composition of the steel was constant throughout and the results apply only to the composition. Variations in the carbon or sulphur contents of the steel will influence its mode of solidification and should, therefore, increase or diminish the hot-tearing range and affect the incidence of tearing. However, the trends obtained with regard to the effects of variations in molding materials should be similar.

The test method that has been described gives a comparison of the amounts of hindrance to contraction that are offered by various molding media under the conditions of test. Any change in these conditions, e.g., casting design, will have an effect upon the results, although with castings of similar size the trends of the degree of hindrance to contraction with various bonds, effect of compact density, etc., should be similar.

With larger castings having a greater heat capacity,

however, the temperature conditions in the mold will be more intense and the rate of solid contraction of the casting will be slower. Organically bonded sands will have more time in which to collapse before the casting is in the hot-tearing range, and the clay-bonded sands, being at a higher temperature, will behave differently.

It is suggested that tearing occurs over a temperature range, i.e., tears are initiated at high temperatures, probably within the solidus/liquidus region and with only slight loads (of the order of a few pounds) acting on the casting. The tears are propagated further as the stresses induced in the casting become greater down to a temperature at which the steel rapidly develops strength or ductility, i.e., subsolidus.

If the build-up of stress (due to severe conditions of hindrance to contraction) is rapid during this range then the tearing will be severe and may propagate across the casting section. If, however, the build-up of stress is slow (i.e., with mild conditions of hindrance to contraction) compared with the increase in strength and ductility with falling temperature, then the initially formed tear will not become enlarged. In particular it has been shown:

a) Hot tearing is less likely to occur and is less severe in castings poured with low temperatures.

b) High casting temperatures do not accentuate the tears in castings held by compacts bonded with clays.

c) An increase in the casting temperature with castings held by compacts containing linseed oil makes the tearing more severe.

The investigation has shown that the behavior of a molding medium under casting conditions cannot be assessed by its properties at room temperatures, e.g., sand compacts having high compressive strengths at room temperatures may offer less resistance to the contraction of the casting than compacts having low compressive strengths.

Fig. 31—Section of casting poured at 1525 C (2777 F) restrained by test block containing 1.5 pct linseed oil.

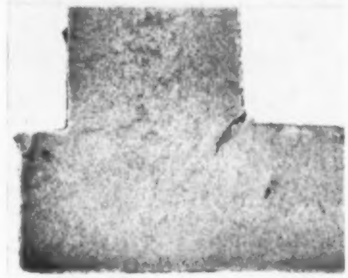


Fig. 32—Section of casting poured at 1575 C (2867 F) and restrained by test block containing 1.5 pct linseed oil.

Fig. 33—Section of casting poured at 1625 C (2957 F) restrained by test block containing 1.5 pct linseed oil.

Contraction Resistance

As the molding material in contact with the casting is heated rapidly to a high temperature [above 1350 C (2462 F)], it follows that it is the strength properties of molding media at these high temperatures which largely control its ability to resist the contraction of the casting. With larger castings the temperatures would be higher and would progress further into the sand.

The investigation has verified that certain molding media are capable of resisting the contraction of the casting to such an extent as to cause tearing of the metal, and that variations in the molding media such as density, type and percentage of bond, etc., affect the resistance to casting contraction, and therefore the incidence of tearing. In particular it has been found:

a) For similar densities dry sands resist the contraction of the casting more than green sands.

b) As the density of green- or dry-sand compacts increases, so does its resistance to the contraction of the casting become greater, with a corresponding increase in the likelihood of tearing.

c) The coarser the sand in the compact the greater is the compact's hindrance to the contraction of the casting.

d) Castings restrained by compacts bonded with clays (with the exception of fireclay) contained only small tears.

e) In the range of clay binders tested, the greatest hindrance to the contraction of the casting was offered by mixes containing fireclay, and bentonite plus 20 pct silica flour.

f) Compacts containing 2 to 3 pct bentonite offer higher resistance to casting contraction than compacts with 1.5 pct and from 4 to 10.0 pct bentonite.

g) The most severe tearing encountered was in castings held by compacts containing organic binders.

h) A reduction in the amount of linseed oil in the compact renders it more collapsible and reduces the extent of tearing.

Very little difference was found with regard to the extent of tearing in castings held by blocks bonded with the various clays, the most severe cases of tearing being associated with castings restricted by sands bonded with organic materials, i.e., linseed oil and phenol resins. It would then appear with castings of the size employed, that the amount of heat available

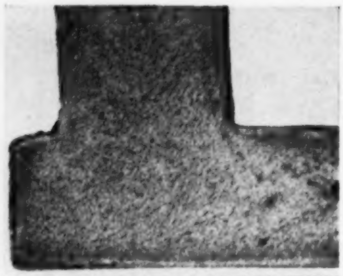


Fig. 34—Section of casting poured at 1525 C (2777 F) and restrained by test block containing 5 pct bentonite.

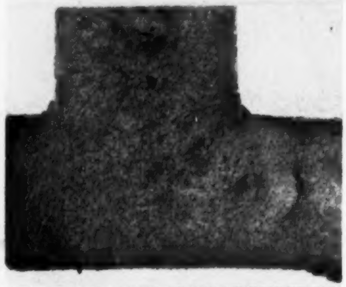


Fig. 35—Section of casting poured at 1575 C (2867 F) and restrained by test block containing 5 pct bentonite.

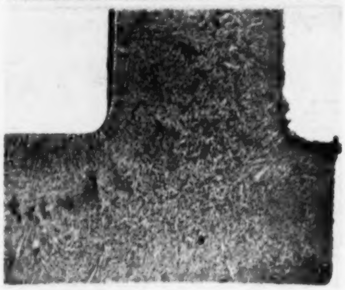


Fig. 36—Section of casting poured at 1625 C (2957 F) and restrained by test block containing 5 pct bentonite.

is insufficient to burn away the organic bond quickly and cause rapid collapse of the core.

The addition of extra heat to the casting by increasing the casting temperature did not affect the time of collapse of these cores and reduce the extent of tearing.

Further work, using a similar testing procedure but employing a much larger casting, is in hand.

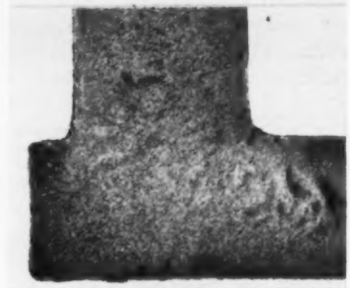


Fig. 37—Section of casting poured at 1575 C (2867 F) and restrained by test block containing 20 pct silica flour.

Fig. 38—Section of casting poured at 1625 C (2957 F) and restrained by test block containing 20 pct silica flour.

Acknowledgments

The author wishes to acknowledge permission granted by the British Steel Casting Research Association to publish the information contained in this paper.

References

1. C. Wyman, "Report on A.F.S. Steel Division Project," A.F.S. Transactions, vol. 58, p. 144 (1950).
2. J. M. Middleton and H. T. Protheroe, "The Hot Tearing of Steel," *Journal*, Iron & Steel Institute, Aug. 1951, pp. 384-400.
3. H. F. Bishop, C. G. Akerlind and W. S. Pellini, "Metallurgy and Mechanics of Hot Tearing," A.F.S. Transactions, vol. 60, p. 818 (1952).
4. A.F.S. Committee Report "Causes of Rat-Tail Casting Defects," A.F.S. Transactions, vol. 56, pp. 116-137 (1948).
5. R. E. Morey and C. G. Ackerlind, "A Study of the Effects of Various Binders and Additions on the Hot Strength of Molding Sands," A.F.S. Transactions, vol. 58, pp. 411-422 (1950).
6. H. W. Dietert, Modern Core Practice and Theories, American Foundrymen's Society.

Arthur Tuscany Dead at 59

Arthur J. Tuscany, well-known trade association consultant, died recently at his home in Cleveland at the age of 59.

Mr. Tuscany, shown at left with William W. Maloney, AFS Secretary, at the 1952 Society Convention in Atlantic City, served several industries as executive-manager of trade associations for over 30 years. Most recently manager of the Foundry Equipment Manufacturers Association and the Steel Kitchen Cabinet Manufacturers Association, he also at various times headed the Ohio Foundries Association, Gray Iron Founders Society, Metal Lath Manufacturers Association, and Foundry Supply Association.

Born and educated in Cleveland, Mr. Tuscany was very active in numerous business, civic, social, and religious organizations, and was a long-time AFS member. His death is a distinct loss to the industry.

Committee Conducts Survey on Fluidity

AFS Fluidity Testing Committee is seeking the answers to important questions in its investigation of testing procedures in the industry. Here is your opportunity to assist in the securing of fluidity testing data needed to complete Committee surveys.

At a Fluidity Testing Committee meeting in Chicago, held on May 7, 1953, it was decided to conduct a survey of the ferrous and non-ferrous industries. The committee, under the chairmanship of J. H. Schaum, National Bureau of Standards, Washington, D.C., agreed to use a questionnaire prepared last year by C. W. Briggs, technical director, Steel Founders Society of America, Cleveland. It has since been slightly modified by suggestions from various members of the committee.

The committee feels that this survey will show the extent of interest in fluidity testing, the type of foundries, and the manner in which it is being used. It will be used as a guide for future activities of the group.

The Purpose

In order to assist the committee in carrying out its program, American Foundryman is printing the questionnaire herewith. It can be answered through the use of suitable check marks, as indicated. Our readers are requested to fill out the form, if it is applicable, tear out and mail the entire page to: Technical Director, American Foundrymen's Society, 616 South Michigan Avenue, Chicago 6, Ill. All replies will be tabulated, interpreted, and the information summarized in the form of a report to be presented at the 1954 Annual A.F.S. Meeting at Cleveland.

Questionnaire on Fluidity

The following questionnaire is prepared with the idea of determining the use of fluidity testing in the regular production of all types of metal castings. The results from the questionnaire will be tabulated and presented by the Committee so that the over-all situation may be known by industry.

1. Do you use the fluidity test:
- **a. For control of each heat** ______
- **b. As a daily check** ______
- **c. From time to time for information purposes** ______
- **d. For research work** ______
- **e. Seldom** ______
- **f. Not at all** ______

2. Is the fluidity test used:
- **a. At the furnace** ______
- **b. On the pouring floor** ______
  - **(1) Beginning of pour** ______
  - **(2) Middle of pour** ______
  - **(3) End of pour** ______

3. Have you set minimum lengths of fluidity run for operation in (2) above? Yes ___ No ___
What are these values? ______

4. Do you use the fluidity test as a production control of:
- **a. Tapping temperature? Yes ___ No ___**
- **b. Pouring temperature? Yes ___ No ___**

5. Type of Fluidity Test
- **a. Rod** ______
- **b. Spiral** ______
- **c. Other** ______

6. Please attach sketch or photograph of fluidity test piece showing dimensions ______

7. Molds for Fluidity Test are produced as:
- **a. Green sand molds** ______
- **b. Dry sand molds** ______
- **c. Core assemblies** ______
- **d. Metal molds** ______

8. Are mold washes used? ______
If so, what kind? ______

9. Approximate weight of assembled mold ___ lb

10. Approximate weight of metal to pour in one mold ___ lb

11. How is temperature measured when correlating temperature and fluidity? ______

12. Fluidity Testing is used in producing the following casting:
- **Steel** ______
- **Malleable Iron** ______
- **Cast Iron** ______
- **Nodular Iron** ______
- **Brass and Bronze Alloys** ______
- **Aluminum and Magnesium Alloys** ______
- **Others:** ______

If you wish to make further remarks, enclose a letter with the questionnaire.

Fig. 1—Foam mix ready to pour.

Fig. 2—Mix is carefully poured.

Cast Aluminum Molds Used For Foam Rubber Products

ROBERT F. DALTON / *Dev. Eng., U.S. Gypsum Co., Chicago*

It's only a few short steps from blueprint to precision cast aluminum dies for forming foam rubber shapes when plaster molds are used.

▪ Starting with blueprints of the castings to be made, the foundry makes plaster patterns. A metal template of the inside contour (the critical side of the casting) is made with 1/8-in. shrinkage allowance. A plaster male is made on a marble slab using the templates to form the pattern as the plaster is going through its period of plasticity. For this, formulated plasters are available with a relatively long period of plasticity so that they may be shaped or screeded under a template for relatively long periods of time, as the plaster continues to set. More than one plaster mix may be used to complete the pattern.

This plaster male is soap shined (spray or swab with soap solution, polish with cloth after a few minutes) or lacquered, a coat of separator (parting compound) is applied, and a splash cast opposite is made using a low expansion, low consistency gypsum cement. Sisal fibre is used to reinforce this relatively thin (1-2 in.) splash cast and to "tie in" a metal or wood frame which promotes rigidity, ease of handling and a flatback surface. This is the production pattern, made in a space of a few hours at a very economical cost. When the patterns have been through the foundry they may be stored an indefinite time for future orders. The pattern is lacquered or soap shined and a coat of separator applied and is now ready for foundry use.

Preparing the Foamed Plaster

Two hundreds pounds of a specially formulated plaster is added to two hundred pounds of warm (100 F) water, allowed to soak for a few minutes and then mixed vigorously for 3-4 minutes with a high speed wire whip. This action entrains air into the formulated plaster and the volume of the mix is increased some 25 per cent. This may be checked by using a measuring stick before and after mixing.

The plaster slurry should be mixed until it starts to cream. This action may be noted by watching the mix at the side walls of the mixing vessel and when creaming starts the plaster will slow down in speed as it travels in the direction of the mixer shaft. The foamed mix containing definite amounts of plaster, water and air is then ready to pour over the pattern (Fig. 1).

Making the Mold

The pattern is enclosed in a metal flask, joints being sealed with a thick plaster mix if necessary. The

foamed plaster mix is then poured into the flask with as little disturbance as possible (Fig. 2). Note the use of the rubber bowl beneath the pouring spigot to reduce splashing. The plaster is allowed to set for a few minutes and the back of the mold is struck off to make a flat level surface. After 15-20 minutes the assembly is rolled over and the pattern removed with an overhead crane.

Since the pattern makes only the drag half of the mold, the cope is formed over the drag. This is done by claying up vertical and slanting walls to get metal thickness and applying a soap size (spray followed by blowing off, rubbing might damage foamed plaster surface) and a separator to the drag. The cope is then cast by pouring another foamed plaster mix directly over the drag half enclosed in a suitable flask with a pin aligning arrangement. The cope half is struck off flat as was done with the drag half. After 15-20 minutes the mold is separated.

Metal thickness in a horizontal plane is obtained with spacer bars of the proper thickness between the cope and drag as in the production of cast match plates. Metal thickness may also be obtained by laying sheets of water clay or uncured rubber of the proper thickness over the drag half. Thus, relatively inexpensive pattern equipment is required and the time from print to casting is reduced, expediting delivery dates. Wedge gates are provided through the top of the cope.

Drying the Mold

Before casting the metal, the molds must be dried to remove the excess water used during the mixing operation. This may be done in conventional foundry core ovens at normal core oven temperatures. The molds shown in Fig. 3 were dried for 10 hours at 400 F. The presence of free water may be detected with moisture meters; prods should be forced into the center of the thickest part of the mold.

The mold is cleaned, assembled with the proper spacer bars between the cope and drag, and clamped down on a vacuum table. Mold joints are sealed with a plaster mix. Number 43 aluminum alloy is melted in conventional foundry furnaces, dipped out, skimmed carefully and cast at 1250 F (Fig. 4). The relatively high plaster pouring cups allow additional pressure on the metal while filling the mold and are held in place with circular iron weights.

In the background of Fig. 4 may be noted crates of cylindrical insulating riser sleeves. These are formed in core boxes from excess mold making material, dried and shipped to a local sand foundry for use. The insulating riser sleeves increase yield and aid in the production of sounder castings.

The castings are shaken out, gates removed, and a minimum of work done to make them ready for use. A 30-in. cavity length is being cast consistently to $\pm 1/64$ in. (Fig. 5). Wall thicknesses are held to a minimum (3/16 in. for castings pictured) for faster curing of the foam rubber. Thin wall sections over large areas are easier to form in foamed metal casting plaster because of the slow chilling effect of the plaster mold as compared to sand molds. The opportunity for misruns and defective casting is minimized because of the high permeability of the foamed plaster.

Fig. 3—Molds are dried 10 hours at 400 F.

Fig. 4—No. 43 aluminum alloy is cast at 1250 F.

Fig. 5—30-in. cavities cast at high precision.

Shop talk

Practical Questions and Answers

Hot Problem

Please advise which type of iron or steel will retain heat over the longest period of time We require large quantities of discs about 8 in. in diameter that can be heated repeatedly to about 900 degrees, then allowed to cool as slowly as possible.

You can visualize your problem in terms of a bucket with a hole in it. How much water you can put in it depends on the size of the bucket. How fast it will run out, depends on the size of the hole. Translating this into heat, for a given casting the inherent heat capacity of a particular metal governs the heat it will absorb. Rate of heat loss will depend on thermal conductivity of the metal, the nature of the heat extracting medium (air, water, etc.), and the temperature difference between the heated casting and the medium.

It appears unlikely that the comparatively small differences in heat capacity among the common ferrous casting alloys are great enough to concern you. In calories per gram, heat capacities of several metals at 932 F are: aluminum, 115; copper 46.5; iron, 62.3; magnesium, 129; and nickel, 59.4.

Thermal conductivities of these metals in calories per square centimeter, per centimeter, per degree centigrade, per second, are: aluminum, 0.53; copper, 0.94; iron, 0.18; magnesium, 0.37; and nickel, 0.22.

Magnesium, with its high heat capacity and relatively low thermal conductivity would appear to meet your needs on purely thermal grounds as nearly as we can determine from the meager information you have supplied. However, mechanical properties and resistance to operating atmospheres at elevated temperatures must certainly be considered.

Moisture in Heap Sand

We pour off once a day, shaking out and conditioning the individual sand heaps at night for the following day. How can we control our moisture?

Accurate moisture control of heaps is difficult unless you carefully condition the sand using one of the several types of units on the market, then check the moisture content, and recondition if necessary. Control is difficult, of course, because the size and number of castings poured in any heap vary, thus changing from day to day the amount of drying out and the amount of new sand needed.

It is advisable to check not only moisture, but green compressive strength and permeability of your heaps. Equipment can be purchased that will enable you to make all three, and other, tests in several minutes. Whether or not you use sand test equipment, you could establish an approximate relationship between the amount of metal poured in each heap (number of molds would do as well if type and size of casting do not vary greatly for any heap) and the amount of new sand and moisture that should be added after each heat.

Briquetting Borings

We produce two to three thousand pounds of low alloy cast iron shavings per day and have tried recovering them in two ways without success. Briquets made with a hand-operated brick making machine crumbled in handling although we used 15 per cent cement as a binder. Briquets made by a local firm using pressure only gave us a density of about 62 per cent of solid iron gray. Using these briquets we get slower melting, excessive oxidation, excessive slag formation, and excessive burn-out in the melting zone.

A number of foundries successfully use briquetted borings. First step is removal of entrained cutting oil and water by washing, centrifuging, or heating. The briquets are produced in presses at the rate of about three to four tons per hour, at 300 tons pressure with no binder added. They are about 4 in. in diameter, 3¾ in. thick, and weigh about 11 lb, resulting in a density of about 80 per cent. Cost of briquetting is approximately $2.50 to $3.00 per ton.

Experience of a number of foundries indicates that briquets can be used (10 to 20 per cent of the charge) without adverse effect on coke consumption, melting rate, metal temperature, metal quality, or melting loss. At least two United States concerns manufacture suitable briquetting presses. You might consider minimizing the initial investment by developing an arrangement with several nearby foundries for joint purchase of a press.

Stress Relief of Gray Iron

I am investigating the relative merits of aging and stress relief annealing of cast iron. This will deal primarily with the effectiveness of such treatments for the removal of casting strains to minimize distortion after machining. Your comments will be appreciated.

Stress relief heat treatment is your best bet. It has long been established that aging of castings for long periods by subjecting them to normal atmospheric changes, does relieve some of the stresses if you wait long enough, but cannot possibly eliminate more than a small fraction of the total stress in the casting.

To remove internal stresses, it is necessary to heat the casting to a temperature at which plastic deformation can take place. Stress relief of gray iron castings begins at a temperature of about 650-700 F, but is accomplished much more effectively at 1000-1050 F. At the latter temperature, stress relief will be complete within an hour and a half, whereas a number of hours are required at the lower temperature.

Practice is to heat a gray iron casting slowly to about 1050 F, hold it at this temperature long enough to insure that all sections of the casting have attained this temperature (usually considered to be one hour per inch of thickness), then slowly cool to about 500-600 F, after which the casting may be removed to the air. After such treatment, distortion during subsequent machining will be practically nil.

It is important not to exceed a temperature of 1000-1050 F as the as-cast mechanical properties of the iron will be reduced due to rapid decomposition of the pearlitic matrix. This detrimental effect occurs extremely rapidly in the so-called pearlite interval, which is just below the transformation temperature of the metal and is at its peak in the range 1200-1250 F. As much as 30 to 40 per cent

depreciation in mechanical properties will occur in three to four hours in any portion of the casting heated to within this range.

If castings are stress relieved, it is important during the machining of critical castings ultimately expected to become part of accurate machine tools, that internal stresses not be re-established during the machining operation by taking excessively heavy cuts.

Silicon Bronze

I am interested in obtaining some information on the casting of silicon bronze

Strict sand control is important in the casting of silicon brasses and bronzes. A routine should be set up and strictly followed. Thorough mixing and aeration are essential and moisture should be kept below 6 per cent lest excessive dross and gas cavities result. Sand of the following specifications, given in the AFS book COPPER-BASE ALLOYS FOUNDRY PRACTICES, gives good results and yields castings with a fine, smooth, clean finish:

AFS Grain Size	140-200
AFS Clay Content, %	10-20
Permeability	15-39
Green Compression, psi	7-9
Moisture, %	3-6

In most cases, facings are not needed, but on castings poured at high temperatures, dry plumbago brushed on the molds gives a smoother, cleaner casting.

Shrinkage of copper-silicon alloys is about halfway between tin bronze and manganese bronze. Both open and blind risers are used with silicon bronze, and generous fillets and padding are recommended. All types of melting units are used and best results are obtained with a slightly oxidizing atmosphere. The metal should be melted as rapidly as possible and temperature raised only slightly above (100-150 F) the necessary pouring temperature. When the required temperature is reached, the metal should be poured into ladles immediately and not held in the furnace.

Use of a charcoal cover is discouraged and deoxidation is considered unnecessary because of the high silicon content. However, a thin cover of lead-free bottle glass or fused borax is a good precaution.

Pouring temperatures range from 2100-2150 F for small, intricate castings, to 2000-2050 F for small and medium castings with no large sections to feed, to 1900-1950 F for large castings, sticks, and bushings.

Heat treatment has little or no effect on silicon bronzes.

Sprue Shape

We have always favored a square sprue because we think it eliminates swirling of the metal and sucking in of air. The AFS Light Metals Research Committee, through the motion pictures on gating, recommends a round sprue. Who's right?

A sprue of square or rectangular cross section generally is superior to a round sprue in avoiding swirling of molten metal, but this statement must be qualified by results of the AFS research conducted at Battelle Memorial Institute. Pouring metal directly into and toward one side of a round sprue will cause much less swirling in a small diameter sprue than in a sprue of large diameter. The large diameter sprues in which aggravated swirling can occur also permit excessive agitation in the sprue, resulting in the introduction of trapped gas holes and oxides in the casting. Use of a tapered sprue and a pouring cup or basin over the sprue, recommended in the research reports, is very effective in avoiding swirling regardless of the shape of the sprue cross section, and is of great advantage in preventing agitation of metal in the sprue.

WALTER E. SICHA, *Chief*
Cleveland Research Div.
Aluminum Co. of America

Wants Specific Recommendation

Would you recommend the treatment for molten brass and bronze?

Sorry we can't make specific recommendation of a proprietary product. It is against the policy of AFS.

In general, it is customary to melt brasses and bronzes under a slightly oxidizing atmosphere to avoid solution of reducing gases. Before pouring, about 2 oz of phosphor copper per 100 lb of melt should be added to eliminate the oxygen.

Maximum Machinability

We buy mixer and burner castings for gas-fired appliances from several foundries and encounter difficulty in machining, even though some of the castings have been annealed. What type of iron should we specify and how can we be sure it will have maximum machinability?

Gray irons, in general, are covered by A.S.T.M. Specification A-48 which provides for gray irons having minimum tensile strengths of 20, 30, 40, 50, and 60 thousand psi. Since strength is not important in your case, and Class 20 irons are generally most easily machined, Class 20 gray iron should suit your purpose. With machinability such an important factor, and size and thickness small (1-3 lb, minimum section 5/32 in.), you should aim for maximum cutting speed and tool life through annealing.

Heat the castings to 1650 F, hold until all portions have attained this temperature (at least an hour), then cool slowly in the furnace to approximately 800 F. This treatment should decompose all primary carbides, which reduce machinability in the as-cast condition.

During the recent AFS Convention, over 300 foundrymen visited the Crane Co. Chicago plant. Group shown here is inspecting the operation of an automatic grinder as gates are removed from annealed malleable iron elbows.

Low-frequency induction melting furnaces in operation.

High Efficiency Brass Melting In Low-Frequency Furnaces

G. N. Landis / *Chief Elect. Eng., Hydropress Inc., N. Y.*

Efficient melting by low-frequency induction calls for correct cross-sectional area of the channel which forms the one-turn secondary winding. An experienced electrical engineer gives a practical method of determining the best channel size.

■ A low-frequency induction furnace, often used for melting non-ferrous metals such as brass, consists essentially of (Fig. 1): (1) steel laminations; (2) primary coil; (3) refractory lining; and (4) secondary channel with the pool of molten metal. The most decisive point in getting best efficiency is the cross-sectional area of the channel within the furnace lining, which forms the secondary, one-turn winding.

A furnace with a capacity of 1200 lb can melt brass (70 Cu-30 Zn) in one hour, when operated with a power input of 120 kw. Under favorable conditions, that is, with the correct channel section, a power factor of approximately 0.70 is obtained. The melting current will become 390 amp on a furnace voltage of 440 v. However, it was found that some 1200 lb furnaces were operated with oversized channels with the result that 1.8 hr were needed to melt 1200 lb of the same material with a melting current of 740 amp on 440 v.

The power input for a furnace depends on the magnetic flux; it can be increased by applying a higher voltage, or by reducing the effective number of turns on the furnace coil by means of tap switches. This adjustment of power input may be used to take care of alloys with different electrical conductivities. A special lower voltage is used to switch the furnace from full melting power of 120 kw at 440 v to a low power (12 kw at approximately 140 v) for holding heat, to prevent the freezing of the molten metal within the channel, while the furnace is not on melting duty. These figures are only approximate.

Another factor, which determines the power input besides the magnetic flux, is the ohm-resistance of the channel loop, which depends on the conductivity of the molten metal, and the cross-sectional area of the channel. Consider a furnace which has been tried out

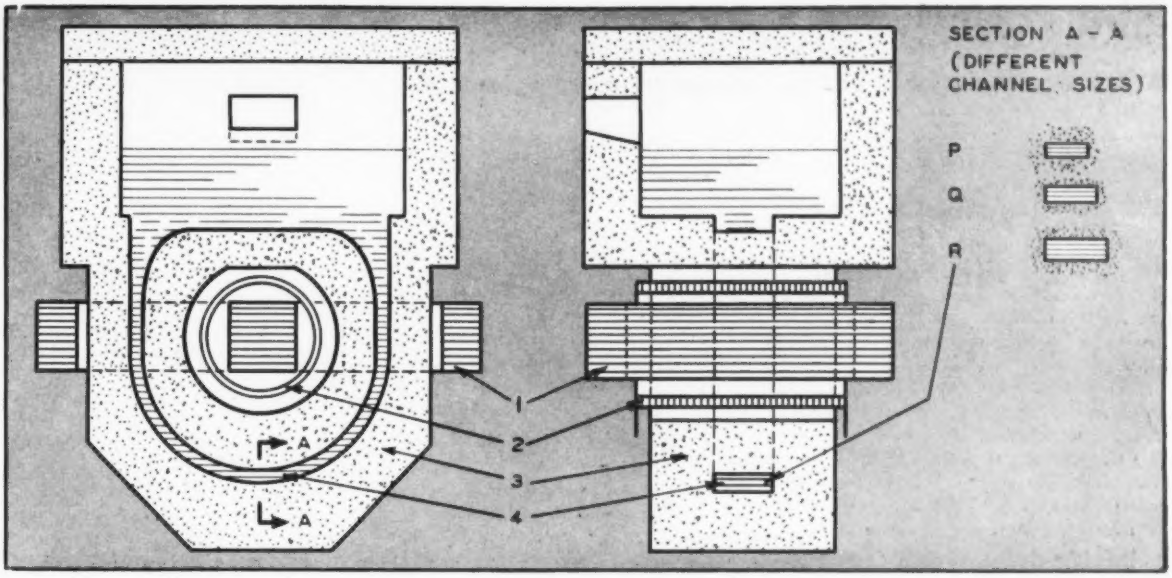


Figure 1.

with different channel sections. The furnace acts electrically with these different sections like a transformer with a constant inductive load represented by the stray flux and a variable resistance load. The variations are explained by the different channel sections assuming that the same material is always melted. The behavior of a transformer under such loads is illustrated in Fig. 2.

Voltage Taps

In Fig. 2, the curves A and B are understood to be for melting duty under two different voltage tappings; A represents the curve for the low power voltage for heat holding. The operating point P_1 is obtained on full power with the most favorable channel section, corresponding to 120 kw with 390 amp; with the same channel we get the point P_2 on standby voltage, or P_3 on a higher tapping for full power.

Operating points which give the highest possible power input with reduced power factor are Q_1, Q_2, and Q_3. They are obtained with a slightly larger channel. If the channel is increased further, we arrive at the operating points R_1, R_2, and R_3. The point R_1 represents the aforementioned case of a furnace which worked with a power input of 80 kw, while the melting current was 740 amp at 440 v due to an oversized channel. The curves show clearly the bad effect of the oversized channel.

A smaller channel section should be used when high copper (90 per cent) alloys have to be melted.

Use Trial and Error Method

There is as yet insufficient data available on the specific resistance of the different alloys at their melting temperature. The best channel section must therefore be found by trial. Most of the data have been collected on furnaces of 1200 lb capacity, for 70:30 brass, for which application Fig. 2 is shown. The channel sections which were used on different installations range from 4 in. x 1 in. (4 sq in.) down to 3 in. x ¾ in.

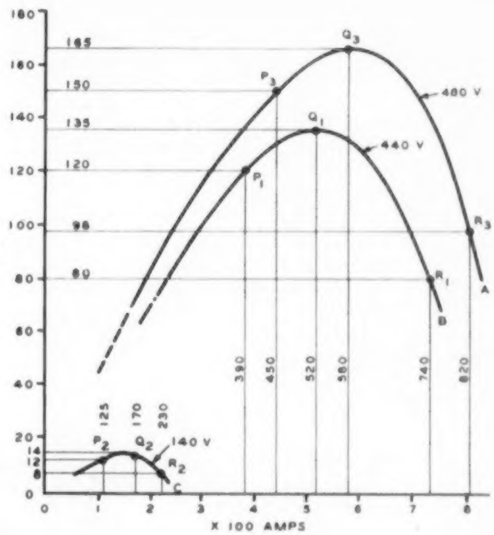


Figure 2.

(2.25 sq in.) or 2¾ in. x ⅞ in. (2.41 sq in.). The worst results shown in the diagram were observed with the section 4 in. x 1 in. Several furnaces were improved after relining, when the smaller channel size was introduced.

To collect the information necessary to judge proper channel size, each furnace installation should be equipped with dependable instruments showing the furnace voltage, the current in amperes, and the power input in kilowatts. The more favorable channels will show higher kilowatt input at lower furnace current, assumed that on all comparative tests the same type of brass and the same voltages have been used. Another benefit for these instruments is that by showing lower power input at higher current, they indicate a worn out channel, requiring relining of the furnace.

News of Technical Committees

Cast Metals Handbook

This Committee met on June 2 in Chicago to discuss revision of the handbook. It was agreed, under the chairmanship of S. C. Massari, that the 1944 edition contained much superfluous material, and that the new edition should be a small encyclopedia in some degree.

The new edition will be designed primarily for the consumer and user of castings, and secondarily for the student and foundryman. This purpose will require revision and complete rewriting in some sections because information in those parts is inadequate.

After discussion of the purpose of the revised manual, the Committee decided that it should attempt to sell the advantages of castings over other processed parts, mostly to correct misinformation. Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, was assigned this section, which will be the first chapter in the new manual.

Other general subjects to be covered include: metal casting processes, general design, pattern equipment, molding methods, inherent mechanical properties of cast metals, engineering properties of cast metal, and inspection methods for castings.

It was decided that subcommittees or individuals designated to prepare initial drafts or detailed outlines should report by November 1, 1953. Next full meeting of the entire Committee was set for about March 1, 1954.

Cupola Research

The Cupola Research Committee met on June 3-4, 1953, with H. Bornstein, retired, as Chairman; A. E. Schuh, U. S. Pipe & Foundry Co., Burlington, N. J., as Vice-Chairman; and E. H. Stilwill, Dodge Div., Chrysler Corp., Detroit, acting as Secretary.

The Cupola Handbook was discussed and the revised edition will have a new title: "The Cupola and its Operation." The Committee also felt that a better arrangement of the material in the book was desirable, and that one section of the manual should be devoted to practical cupola operation. This portion could later be reprinted and sold separately.

A tentative division was agreed upon, with five parts: historical, operations, equipment, materials, and technology as the major subjects.

Better information on refractories is desirable, and proper handling of information on coke should be stressed, the Committee concluded. Data on cupola dust suppression and use of the cupola in melting for malleable iron should be included. It was felt that the section on use of the cupola for non-ferrous metals should be revised. The following subjects were mentioned as deserving some mention in the new edition: projecting tuyeres, use of oxygen, control panels, and nodular iron.

Malleable Research

The Malleable Research Committee met on June 12, 1953, at the University of Wisconsin, Madison, Wis. C. F. Joseph, Central Foundry Div., General Motors Corp., Saginaw, Mich., functioned as chairman.

Prof. R. W. Heine, University of Wisconsin, presented the results of recent research. Committee members inspected the methods and equipment used in making the 100-lb induction furnace heats.

Following considerable discussion, it was the consensus that the annealability tests should be re-run, using 1340 F instead of 1300 F as the holding temperature, with specimens removed from the furnace after 3, 6, 9, 12, and 15-hr intervals.

The Committee agreed unanimously that the results and information being obtained from this research fully justifies its continuation for another year after December, 1953. The Committee asked that the Technical Director request the Board of Directors of AFS to include a fiscal appropriation in the 1953-54 budget to cover the cost of this research. The staff of the University of Wisconsin indicated that it would be very happy to continue the project for another year.

Brass & Bronze Division

Chairman B. N. Ames, New York Naval Shipyard, Brooklyn, presided over a Brass and Bronze Division meeting at the Hotel Sherman, Chicago, on May 5, 1953.

A report on the activities of the Research Committee was made by F. L. Riddell, H. Kramer & Co., Chicago. Motions were adopted that the fracture test should be advertised, that the Research Committee meet before the next Executive Committee meeting, and that the production of a film depicting procedures used to make the fracture test be tabled for the present.

W. B. Scott, National Bearing Div., American Brake Shoe Co., Meadville, Pa., reported for the Program and Papers Committee. He presented the titles of papers that might be considered as possibilities for the program for the 1954 Convention in Cleveland.

R. A. Colton, Federated Metals Div., American Smelting & Refining Co., Barber, N. J., reporting for the Sand Committee, discussed problems that the Committee had presented for consideration in its program.

It was agreed that the Executive Committee of the Division hold its annual meeting prior to the Round Table Luncheon, then give the Committee Reports at the Luncheon.

AFS Cast Metals Handbook Revision Committee is shown at its June 2 meeting in Chicago. Standing, from left: James Thomson, J. E. Rehder, Manley E. Brooks, Eric Welander, William A. Kennedy, and Frank B. Rote. Seated, from left: Bernard N. Ames, John W. Bolton, Hyram Brown, G. R. McNeill, S. C. Massari, J. E. Foster, W. D. Stewart, and Howard H. Wilder.

BECAUSE OF B&P's EXCLUSIVE HORIZONTAL MULLING PRINCIPLE

The Speedmullor Gives More Than 3 Times the Mulling

210,000 SQ. INCHES OF MULLING AREA COVERED EVERY MINUTE IN THE 80A

The mulling wheels of the new 80A Speedmullor cover 210,000 square inches of mulling area every minute . . . that's nearly three times the mulling area covered in the latest design conventional mixer.

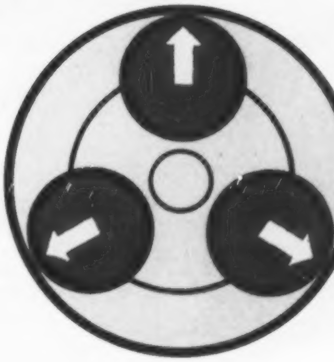
Utilizing the modern principle of centrifugal force, the lightweight horizontal mulling wheels of the 80A apply a pressure of 32.7 p.s.i. to the sand as it is mulled in suspension between rubber-tired wheels and rubber-lined bowl.

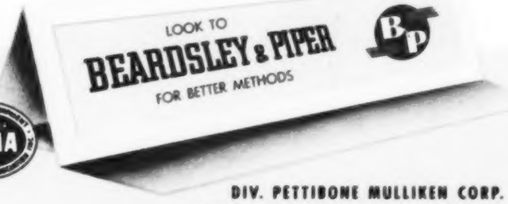
In the latest conventional mixer, pressure is applied by massive spring-weighted, vertical wheels; the maximum pressure according to the manufacturer is 31.5 p.s.i. Thus, using the same basis of computation, the Speedmullor *provides approximately equal mulling pressure over nearly three times the mulling area every minute.* With the added advantages of non-slip, rubber-to-rubber mulling and a much faster sand discharge, more than three times the mulling results.

Every Speedmullor model offers the same comparable advantage.

Above: The three mulling wheels of the 80A Speedmullor rotating at 62 RPM cover an area of 210,000 square inches per minute.

Right: Using centrifugal force, each wheel exerts a pressure of 32.7 p.s.i. against the sand.





FEMA

DIV. PETTIBONE MULLIKEN CORP.
2424 North Cicero Avenue, Chicago 39, Illinois

WRITE TODAY FOR FULL DETAILS

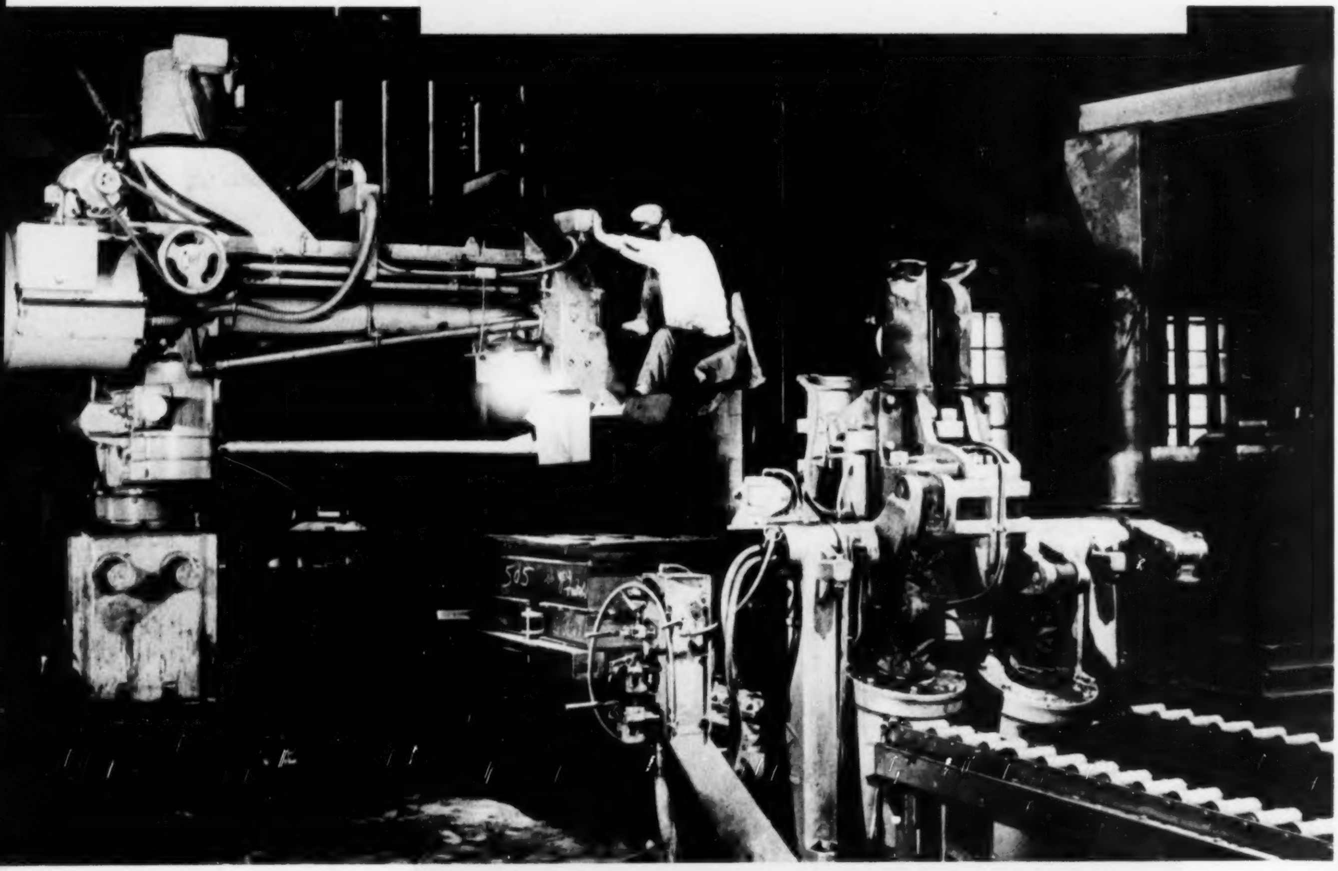
SPEEDMULLOR

6 Models — Capacities from 7 to 76 Tons per Hour

2½ Times Capacity with Half the Men!

HOW Brooks Foundry Company INCREASED CAPACITY FROM 40 TO 100 TONS PER DAY WITH B & P SPEEDSLINGER, CHAMPION SPEED-DRAW, AND J & J ROLLOVER

The Brooks Foundry Company of Albion, Michigan, have mechanized their large-mold production with a Stationary Speedslinger, a B&P Champion Speed-Draw machine, and a J&J 1020 RX Rollover Draw machine. Copes are Speedslinger rammed on the Speed-Draw while drags are Speedslinger rammed on the rollover. Each mold contains from six to eight cores and casting weight varies from 800 to 5000 lbs. Before mechanization thirteen molders produced forty tons of castings per day. Now, seven men are able to produce over one hundred tons per day. This production boost is a tribute to the teamwork of these machines. Champion Speed-Draws and J&J RX Series Rollovers are *job-fitted* to slinger molding units.



Now, 7 men are able to produce 100 tons of castings per day on this Speedslinger molding unit at Brooks Foundry Company, Albion, Michigan. Before installation of the Speedslinger, the J&J 1020 RX Rollover and a Champion Speed-Draw, 13 men produced 40 tons.

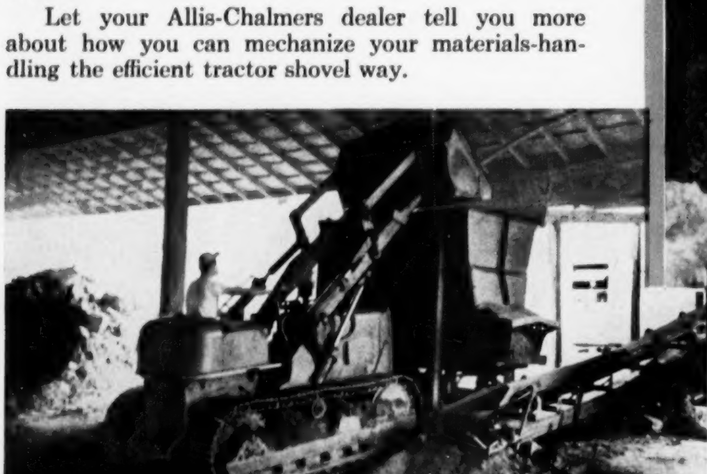
LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

BP

FEMA

write today for complete information

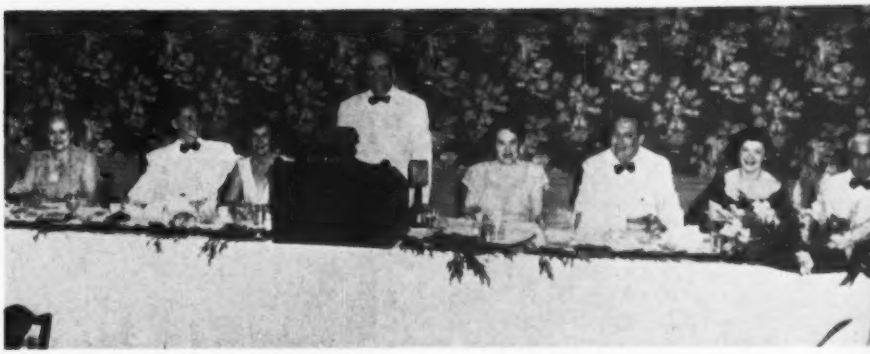
DIV. PETTIBONE MULLIKEN CORP., 2424 North Cicero Avenue, Chicago 39, Illinois



"PROMOTION, and more promotion" will be the theme of his administration George T. Boli, Northern Malleable Iron Co., St. Paul, Minn., said as new president of the Malleable Founders' Society at the organization's annual meeting, June 8 and 9, at the Homestead, Hot Springs, Va. Serving with him as vice-president during the coming year is Charles E. Brust, Eastern Malleable Iron Co., Naugatuck, Conn.

Program of M.F.S. for the coming year, Mr. Boli said, will include launching of an advertising campaign, four sales clinics, and a 5th Market Development Conference.

Highlight of the annual banquet was presentation of the Charles H. McCrea Gold Medal to Charles A. Gutenkunst, Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee. In presenting the award, Charles E. Brust reviewed Mr. Gutenkunst's outstanding service to the malleable castings industry as M.F.S. president (1942-44), as a member of advisory committees to O.P.S. and N.P.A., as chairman of the society's Research & Product Improvement Committee and as member of its Finance Committee.



Frank D. Brisse (standing), retiring president of the Malleable Founders' Society, presided at the society's annual banquet. Seated, left to right, are: Mrs. Charles E. Brust; Charles A. Gutenkunst, Jr., McCrea Medallist; Mrs. George T. Boli; Mrs. Brisse; George T. Boli, incoming president; Mrs. Gutenkunst; and Charles E. Brust, incoming vice-president of the society.

Malleable Founders Society Holds Annual Meeting

Reception

The meeting opened the evening of June 7 with a reception honoring past presidents of M. F. S. Business sessions started the following morning with a report by the retiring president, Frank D. Brisse, Laconia Malleable Iron Co., Laconia, N. H., who presided throughout the day.

Committee reports were presented by: John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill., for Cost Accounting Committee, in absence of J. A. Dufresne, Chicago Railway Equipment Co., Chicago; Thomas A. Scanlan, Eastern Malleable Iron Co., Market Development Committee; C. M. Lewis, Badger Malleable & Mfg. Co., South Milwaukee, Government Affairs Committee; Roy N. Hoffman, Michigan Malleable Iron Co., Detroit, Membership Committee. Additional committee activities were covered by Lowell D. Ryan, M.F.S. managing director, reporting for W. J. MacNeill, Badger Malleable & Mfg. Co.; Carl L. Liebau, Federal Malleable Co., West Allis, Wis., Education Committee; W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland, Finance Committee; George J. Behrendt, Eastern Malleable Iron Co., Research & Product Development Committee; and Wm. A. Kennedy, Grinnell Co., Providence, R. I., Technical Council.

Charles E. Brust, Eastern Malleable Iron Co. (left), presenting McCrea Gold Medal for 1953 to Charles A. Gutenkunst, Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee.

Research Report

Research projects of M. F. S. were briefed by P. E. Kyle, Cornell University, and Earl E. Woodliff, Foundry Sand Service Engineering Co., Detroit. Prof. Kyle outlined work leading to basic information on feeding of malleable castings. Mr. Woodliff described a study of core materials and practices designed to improve production, reduce costs, and develop acceptance tests.

Mr. Brisse presented the report of A. F. Jackson, Lake City Malleable Co., Cleveland, on the National Council Castings. N.C.C. has been supporting the AFS Safety & Hygiene & Air Pollution Program and is promoting the elevation of castings to branch status in any organization which succeeds N. P. A., he stated.

James H. Lansing said in his report as technical and research director that new federal specifications for malleable iron would soon be issued, and that new tests for impact and explosion resistance are being used to evaluate malleable iron.

Economics

The first day's session concluded with a talk on *"The Economics of Productivity"* by W. T. Hogan, Fordham University.

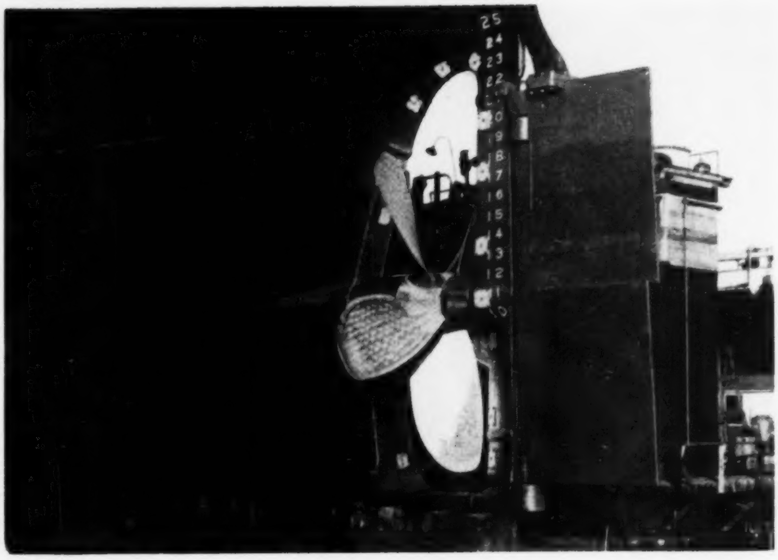
On the second day, following M.F.S. President Boli's address, Dudley V. Walker, Eastern Malleable Iron Co., gave his report as treasurer, and Lowell D. Ryan spoke. He stated that the full facilities of the society would be devoted, to advancing Mr. Boli's program of promotion. K. M. Smith of National Malleable & Steel Castings Co., Cleveland, currently with the Castings Section of N.P.A. commented briefly on his activities.

James H. Smith, Central Foundry Div., General Motors Corp., Saginaw, Mich., briefed his Charles Edgar Hoyt Lecture presented at the AFS Convention in May, and Roscoe Drummond, *Christian Science Monitor*, Washington, D. C., spoke on *"The State of the World"* to conclude the meeting.

Steel Castings Manual Now in Booklet Form

Comprehensive data detailing applications emphasizing the reliability, strength, and versatility of steel castings as an engineering material are now available in booklet form from Steel Founders' Society of America.

Reprinted in manual format, the 16-page, illustrated booklet, "Carbon and Low Alloy Steel Castings," incorporates much essential data of value to the materials engineer, design and production engineering organizations, purchasing departments, engineering students, and university faculty members. The new booklet includes the following general categories: steel casting properties; engineering and design specifications; and procedures, as related to heat treating, joining, design, and inspection in the foundry. Free copies of the manual can be obtained by writing: F. Kermit Donaldson, executive vice-president, Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio.



This five-blade cargo ship propeller was cast from Nialite, an alloy of copper, nickel, aluminum, and other elements, a development of Baldwin-Lima-Hamilton Corp., Philadelphia. Cast in the firm's marine foundry, the new wheel is ready for service on the S. S. *American Clipper* of the United States Lines.

Calendar of Future Meetings and Exhibits

August

10-12. . Dietert Sand School
Detroit Engineering Society, Detroit.

10-19. . Advanced Cast Metals Practice
University of Michigan, Ann Arbor, Mich.

September

17-18. . National Foundry Association
Plaza Hotel, New York. Annual meeting.

17-18. . Niagara Frontier Regional Conference
Statler Hotel, Buffalo.

19-26. . International Foundry Congress
Paris, France. Host: Association Technique de Fonderie de France.

21-22. . Steel Founders' Society
Homestead, Hot Springs, Va. Fall meeting.

21-25. . Instrument Society of America
Sherman Hotel, Chicago. National Congress & Exhibit.

24-25. . Ohio Regional Foundry Conference
Netherlands Plaza, Cincinnati. Sponsored by A.F.S. Cincinnati, Northeastern Ohio, Central Ohio, Canton, and Toledo Chapters.

25. . Malleable Founders' Society
General meeting.

October

8-9. . Michigan Regional Conference
Michigan State College, East Lansing, Mich. Sponsored by A.F.S. Central Michigan, Western Michigan, Detroit and Saginaw Valley Chapters and Michigan State and University of Michigan Student Chapters.

8-9. . Gray Iron Founders' Society
New Hotel Jefferson, St. Louis. Annual meeting.

9-15. . 5th International Congress of Mechanical Manufacture
Turin, Italy. Production methods and parts assembly.

15-17. . Foundry Equipment Manufacturers' Association
Greenbrier, White Sulphur Springs, W. Va. Annual meeting.

16-17. . Northwest Regional Conference
University of Washington and New Washington Hotel, Seattle. Sponsored by Washington, Oregon, and British Columbia Chapters, and University of Oregon Student Chapter.

19-23. . American Society for Metals
Cleveland Auditorium, Cleveland. 35th National Metal Exposition and Congress.

29-30. . Metals Casting Conference
Purdue University, West Lafayette, Ind. Sponsored by Central Indiana and Michiana Chapters, Purdue University, and the Purdue Student Chapter.

November

4-6. . Steel Founders' Society
T & O Conference.

February 1954

11-12. . Wisconsin Regional Foundry Conference
Schroeder Hotel, Milwaukee.

18-19. . Southeastern Regional Foundry Conference
Patten Hotel, Chattanooga, Tenn.

March 1954

15-19. . National Association Corrosion Engineers
Kansas City Municipal Auditorium. 10th Annual Conference.

May

5-7. . American Society of Training Directors
Schroeder Hotel, Milwaukee. Annual Conference.

8-13. . A.F.S. Convention & Exhibit
Public Auditorium, Cleveland.

Correlation

continued from page 48

Foundry Cost Committee. Chairman Ralph L. Lee, Grede Foundries, Inc., Milwaukee, posed the following three questions which the Technical Correlation Committee answered affirmatively: (1) Should the Cost Committee sponsor Question and Answer type sessions at the 1954 Convention? (2) Should all branches of the foundry industry be represented on the Cost Committee through official representatives of the trade associations? (3) Should AFS sell the cost publications of other organizations?

Refractories Committee. Walter R. Jaeschke, Whiting Corp., Harvey, Ill., reporting as chairman of the Refractories Committee, reviewed the 1953 Convention program sponsored by the group. The committee felt, he said, that refractory problems of the various divisions differ and that the committee could serve the foundry industry better by cooperating with the various divisions in presentation of papers at joint sessions.

In the absence of a chairman of the following committees, Mr. Massari presented their reports: Heat Transfer; Plant and Plant Equipment; Fluidity Testing; and Precision Investment Casting.

Major accomplishments of the **Heat Tranfer Committee,** according to its chairman, William S. Pellini, Naval Research Laboratory, Washington, D. C. is the interpretive report covering committee work of the past eight years. The $15,000 investment AFS has made in heat transfer research has been a pump primer which has caused some $165,000 worth of additional research be be made available to AFS members, Mr. Pellini's report stated.

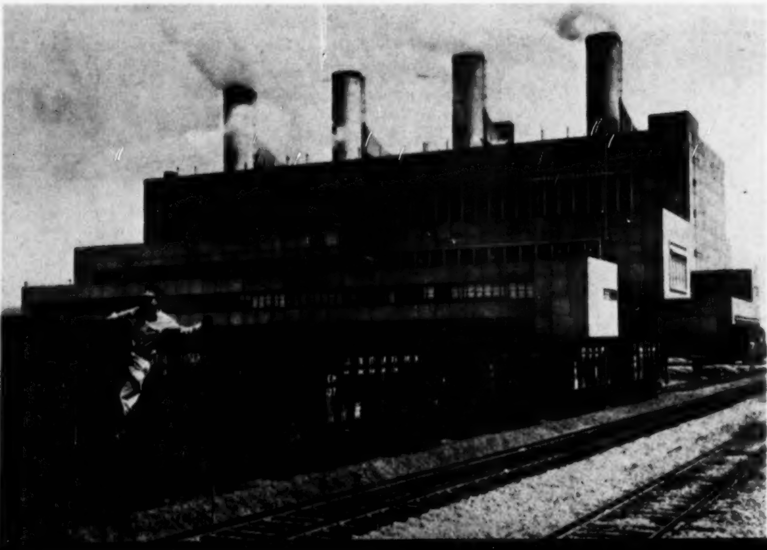
The report of James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., chairman of the **Plant & Plant Equipment Committee,** brought out the value of motion pictures in presenting information relative to plant and equipment. The committee is interested in securing films for use at the 1954 Convention.

The **Fluidity Test Committee** according to the report of Jack H. Schaum, National Bureau of Standards, Washington, D. C., is conducting an industry-wide survey to study use of fluidity tests. (Editor's Note: the questionnaire appears on page 67) Mr. Schaum is continuing as committee chairman.

The report of Robert Neiman, Whip-Mix Corp., Louisville, Ky., chairman, of the **Precision Investment Casting Committee** stated that all sections of a book in preparation were expected to be prepared and consolidated by September. Mr. Neiman will continue as chairman during the coming year.

Safety & Hygiene & Air Pollution. In the absence of J. R. Allan, International Harvester Co., Chicago, chairman of S & H & AP Committee, William N. Davis, S & H & AP director, presented the committee's report. The report outlined the individual activities of the committees on Air Pollution, Dust Control, and Ventilation, Safety, Welding, and the recently-organized committee on Noise.

What is claimed to be the world's largest alloys plant is rising along the banks of the Ohio River, near Marietta, Ohio. Representing an investment of over $100 million by Electro Metallurgical Co. The huge plant will produce Simplex ferrochrome, electrolytic manganese and electrolytic chromium. Shown is the installation power plant, one of the largest industrial plants of its type in the country, producing more than enough electricity to supply domestic power for Philadelphia.



Plaster Mold Casting Committee. Hyman Rosenthal, Pittman-Dunn Lab., Frankford Arsenal, Philadelphia, chairman of the Plaster Mold Casting Committee, reported that interest in a symposium for presentation at an AFS Convention was developing. However, he said, many feel that a symposium in the near future would be premature in view of the rapid changes in plaster mold casting.

Looking ahead to the 1954 Convention, Mr. Massari stated that it would be held in Cleveland, May 8-14, and would combine both technical sessions and exhibits. He reminded the Technical Correlation Committee that in order to guarantee preprinting of 1954 Convention papers approved manuscripts must be in AFS Headquarters by January 15.

Technical Correlation Committee members attending the 1953 meeting were: H. C. Ahl, Jr., Down River Casting Co., Rockwood, Mich.; Bernard N. Ames, New York Naval Shipyard, Brooklyn; George J. Barker, University of Wisconsin; H. Bornstein, Moline, Ill.; E. V. Blackmun, Die Casting Div., Aluminum Co. of America, Garwood, N. J.; Manley E. Brooks, Dow Chemical Co., Bay City, Mich.; Hiram Brown, Solar Aircraft Co., Des Moines, Iowa.

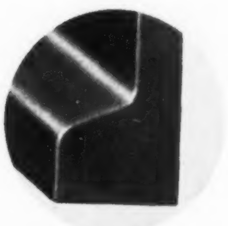
Frank S. Brewster, Harry W. Dietert Co., Detroit; J. W. Costello, American Hoist & Derrick Co., St. Paul, Minn.; Harry J. Jacobson, Industrial Pattern Works, Chicago; Walter R. Jaeschke, Whiting Corp., Harvey, Ill.; George W. Johnson, Vanadium Corp. of America, Chicago; E. T. Kindt, Kindt-Collins Co., Cleveland.

Ralph L. Lee, Grede Foundries, Inc., Milwaukee; W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va.; G. L. McMillin, General Steel Castings Co., Granite City, Ill.; O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis; Hyman Rosenthal, Pitman-Dunn Lab., Frankford Arsenal, Philadelphia.

Frank B. Rote, Albion Malleable Iron Co., Albion, Mich.; H. J. Rowe, Aluminum Co. of America, Pittsburgh, Pa.; W. H. Ruten, Polytechnic Institute of Brooklyn; Clyde A. Sanders, American Colloid Co., Chicago; Milton T. Sell, Sterling Foundry Co., Wellington, Ohio; Milton Tilley, National Malleable & Steel Castings Co., Cleveland; and James S. Vanick, International Nickel Co., New York.

AFS staffers present, in addition to Messrs. Maloney and Massari, were: Wm. N. Davis, director of Safety & Hygiene & Air Pollution; Herbert F. Scobie, technical editor, AMERICAN FOUNDRYMAN; and Jos. E. Foster, technical assistant.

SOLID CENTER
REINFORCING RIB



MACHINED PARTINGS
FULL WIDTH BEARING

ROLLED STEEL CHANNEL CONSTRUCTION
Heavy reinforcing rib around each section to resist torsional strains. Partings are machined square for full-width bearing. The thick flanges have plenty of steel for several refinishings.

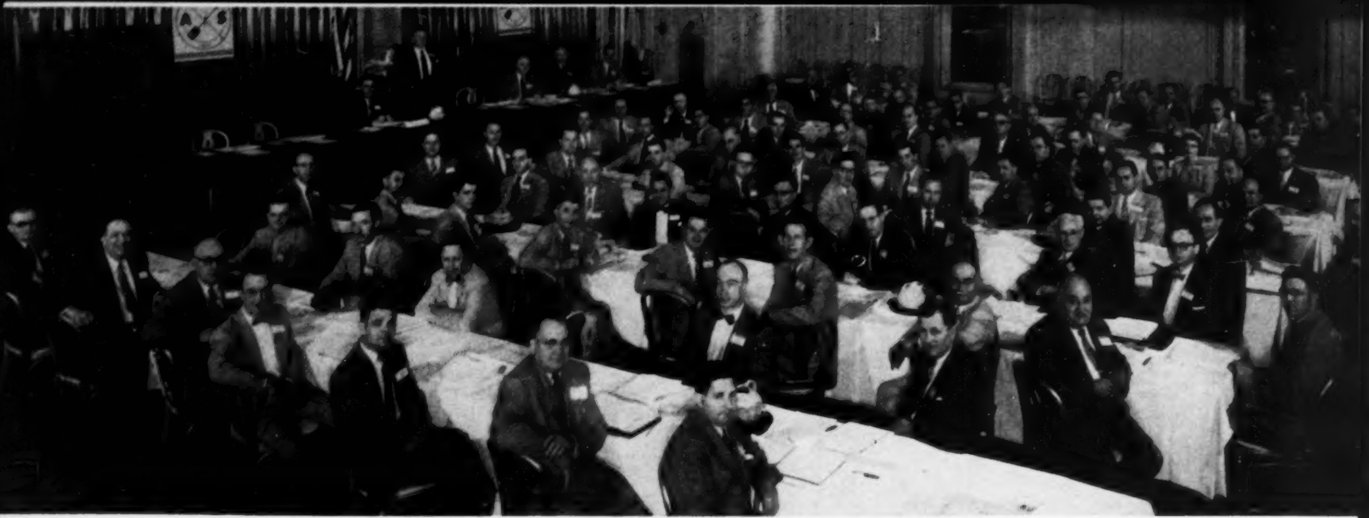
. . . the Flask with a Reputation Backed by 42 Years' Experience

You can produce BETTER CASTINGS at a LOWER COST per casting, with dependable Sterling Rolled Steel Foundry Flasks.

Sterling originated the famous rolled steel channel construction back in 1909 and has devoted almost a half century in developing and perfecting this popular type of foundry flask.

Today, you will find Sterlings used by more than 4500 foundries and every flask proves the Sterling ability to stand up . . . year after year, under rough foundry usage.

STERLING WHEELBARROW COMPANY
MILWAUKEE 14, WISCONSIN, U.S.A.



Chapter News

Chapter Officers Confer

Representatives of the Society's 42 chapters and National officers met at the Sherman Hotel, Chicago, May 18 and 19 for the 10th Annual Chapter officers Conference. Attendance was 102 including 81 chapter officers, mostly chairmen and program chairmen.

Chairman of the conference was President-Elect Collins L. Carter, Albion Malleable Iron Co., Albion, Mich.

After an introduction by Mr. Collins, National President I. R. Wagner, Electric Steel Castings Co., Indianapolis, sketched in the background for the conference. He pointed out that the technical program is the most important activity of a chapter and also cited the need for better-planned membership effort and a clearer understanding of the value of more members, as such.

Technical Director S. C. Massari described the technical operations of AFS and outlined the division and committee make-up. He explained how they operated in developing information for presentation at Annual Conventions and for publication. AFS research projects, which are wholly or in a large part supported with Society funds, were described. He told how Speaker Evaluation Reports received from the chapters aid in finding good speakers and avoiding poor ones.

Following Mr. Massari's talk, Chairman Carter announced with regrets that Mr. Massari was leaving the Society July 1, to return to work in the Industry, and on behalf of the Society wished him every success.

In a lengthy discussion, conferees traded experiences and ideas on developing programs, securing speakers and inducing technical discussion.

The Safety & Hygiene & Air Pollution Program was discussed briefly by President Wagner. William N. Davis, S & H & AP director, then went into more detail, outlining various goals and the progress of the program.

Present Plaque

During the luncheon a plaque was presented to Mr. Wagner for his work as President of AFS. The idea originated with William D. Dunn, Oberdorfer Foundries, Syracuse, N. Y., of the Central New York Chapter. John A. Feola, Crouse-Hinds Co., and Joseph Gibson, Sweets Foundry, Inc., of the chapter, made the presentation. After the presentation, H. Charles Esgar, Foundry Educational Foundation, Cleveland, explained the part the Foundation plays in cooperating with engineering colleges to produce better trained engineers for the industry.

Following the luncheon, Harry E. Gravlin, Ford Motor Co., Dearborn, Mich., described the Detroit Chapter program of promoting interest in foundry industry through schools, newspapers and civic groups. He asked foundrymen to think of, and discuss their work proudly.

Professor Roy C. Schroeder, University of Illinois, Chicago, was then introduced and he reviewed briefly the results of the 1953 Apprentice Contest. He asked where the apprentices of tomorrow were coming from and pointed out the necessity of starting to develop interest in the foundry as a career, in the 7th and 8th grades.

A talk on the National Office by Secretary-Treasurer Wm. M. Maloney, described the national organization of the Society and its breakdown into administrative and technical activities. He pointed out that the National Office acted as publishers and librarians. As publishers, by printing the various technical manuals and the AMERICAN FOUNDRYMAN, and as librarians, by keeping a library of a large number of the technical books published and also donated to the Society. Mr. Maloney also outlined the various staff duties of the National Office.

President Wagner then discussed the new AFS Headquarters Building in DesPlaines, Ill., and pointed out that the building of this permanent headquarters is actually a hedge against anticipated further inflation. He said that specifications had been drawn up and approved and that ground would be broken the first part of August.

Reviews Recent Changes

H. F. Scobie, technical editor of AMERICAN FOUNDRYMAN, explained how the magazine was prepared and how material is obtained. He reviewed some of the recent changes in the book. Plans for the future, he said, are aimed at giving readers the most up-to-date material possible in the most attractive, easy-to-read form.

Secretary Maloney then discussed the Nominating Committee and listed the eligible chapters. He asked chapters that had not done so, to submit names

of candidates for the national Nominating Committee.

Conferees got better acquainted at the Conference Dinner concluding the first day's activities. Principle address was a humorous talk by Freddie Caserio, former Golden Gloves champion.

Several conferences with delegates of various chapters were held immediately following the dinner program, to schedule speakers for future meetings, discuss chapter boundaries and discuss regional conferences.

To begin the second day's activities, Hans J. Heine was introduced by Chairman Carter as a new member of the AFS Technical Staff. Mr. Carter proceeded to outline Mr. Heine's technical background.

Keeping up the membership was the next topic of discussion. It was pointed out by Secretary Maloney that 22 of the chapters had made their targets for the past year. This, he said, was a very good record. New targets for the coming year were discussed and set. Mr. Maloney reviewed the current membership report and noted that as of June 10, membership was 11,158.

Chapters' representatives told how they build up management interest, awarded prizes for bringing in new members, appointed plant and regional membership chairmen, as ways of increasing membership. Other methods used for increasing membership were explained by some of the chapters that made their targets during the past year.

Exhibit Manager, A. A. Hilbron, discussed the organization of a Foundry Show. He told of the time necessary to set up an exhibit as large as the foundry show and also explained the obligations of the host chapter. In concluding he said that the 1954 Convention would be held in Cleveland May 8 to 14 and many of the details were already completed.

John A. Feola, Crouse-Hinds Co., center, and Joseph Gibson, Sweets Foundry, left, presenting plaque from Central New York Chapter to AFS President I. R. Wagner.

The chapter chairman's job was next on the agenda. Mr. Maloney made reference to the Chapter Manual after which, questions were asked from the floor.

The conference closed with the customary question and answer session, The Shakeout.

Directors And Guests Participate

Participating in the 10th Annual Chapter Officers Conference in addition to those mentioned, were the following national directors: Martin J. Lefler, Oliver Corp., South Bend, Ind.; C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago; G. Ewing Tait, Dominion Engineering Works, Ltd., Montreal, Que.; James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., and Robert E. Kennedy, AFS Secretary Emeritus, Wilmette, Ill.

Guests included: J. R. Allan, International Harvester Co., Chicago; H. Charles Esgar, Foundry Educational Foundation, Cleveland; Professor Roy W. Schroeder, University of Illinois, Chicago, and Hans J. Heine, AFS Assistant Technical Director.

All Chapters Represented

Chapter Officers present were chiefly chairmen and program chairmen (usually also vice-chairman). They were:

BIRMINGHAM—Chairman Biddle W. Worthington, McWane Cast Iron Pipe Co., Birmingham, Ala. Vice-Chairman Edwin E. Pollard, Alabama Pipe Co., Anniston, Ala.

BRITISH COLUMBIA—Chairman William R. Holeton, B. C. Research Council, University of British Columbia, Vancouver, B. C., Canada. Vice-Chairman Howard H. Havies, Vivian Diesels & Munitions Ltd., Vancouver, B. C., Canada.

CANTON DISTRICT—Chairman Robert A. Epps, Stoller Chemical Co., Akron, Ohio. Vice-Chairman Alfred S. Morgan, Babcock & Wilcox Co., Barberton, Ohio.

CENTRAL ILLINOIS—Chairman Henry Felten, Peoria Malleable Castings Co., Peoria, Ill. Program Chairman

Pedro Gomez, left, and Frank Madrigal, second from right, of the Mexico Chapter, discuss conference activities with Collins L. Carter, chairman of the conference, second from the left, and S. C. Massari, AFS Technical Director, far right.

Edwin E. Pollard, center, vice-chairman of the Birmingham Chapter, regales Wm. W. Maloney, AFS Secretary-Treasurer, left, and Biddle W. Worthington, Chairman of the Birmingham Chapter, right, with one of his famous stories.

Burton L. Bevis, Caterpillar Tractor Co., Peoria, Ill.

CENTRAL INDIANA—Chairman Dallas F. Lunsford, Perfect Circle Corp., Hagerstown, Ind. Vice-Chairman Fred E. Kurtz, Electric Steel Castings Co., Indianapolis

CENTRAL MICHIGAN—Chairman John E. Wolf, Midwest Foundry Co., Coldwater, Mich. Secretary-Treasurer Gerald Strong, Homer Foundry Corp., Coldwater, Mich.

CENTRAL NEW YORK—Chairman John A. Feola, Crouse-Hinds Co., Syracuse, N. Y. Vice-Chairman Joseph Gibson, Sweets Foundry Inc., Johnson City, N. Y.

CENTRAL OHIO—Chairman C. W. Gilchrist, The Cooper-Bessemer Corp., Mt. Vernon, Ohio. Program Chairman Raymond M. Meyer, Ohio Steel Foundry Co., Springfield, Ohio. Secretary N. H. Keyser, Battelle Memorial Institute, Columbus, Ohio.

CHESAPEAKE—Chairman William H. Baer, U. S. Navy Dept., Bureau of Ships, Washington, D. C.

CHICAGO—Chairman John A. Rassenfoss, American Steel Foundries, East Chicago, Ind. Vice-Chairman Robert L. Doelman, Miller and Company, Chicago.

CINCINNATI DISTRICT—Director John D. Sheley, Asst., The Black-Clawson Co., Hamilton, Ohio. Vice-Chairman Harry F. Greek, The Hill & Griffith Co., Cincinnati.

CORN BELT—Chairman Earl White, Paxton-Mitchell Co., Omaha, Neb. Vice-Chairman Bert J. Baines, Omaha Steel Works, Omaha, Neb.

DETROIT—Chairman Harry E. Gravlin, Ford Motor Co., Dearborn, Mich. Vice-Chairman Claude B. Schneible, Claude B. Schneible Co., Detroit

EASTERN CANADA—Chairman John G. Hunt, Asst. Dominion Engineering Works, Ltd., Montreal, Que. Vice-Chairman Claude Bourassa, Archer-Daniels-Midland Co., Montreal, Que.

EASTERN NEW YORK—Chairman Edwin S. Lawrence, General Electric Co., Schenectady, N. Y.

METROPOLITAN—Chairman Bernard N. Ames, U. S. Naval Shipyard, Brooklyn, N. Y. Vice-Chairman Charles Schwalje, Worthington Corp., Harrison, N. J.

MEXICO—Chairman Frank Madrigal, Fundidora de Aceros Tepeyac, S. A., Mexico City, D. F. Vice-Chairman Pedro Gomez, Fundicion de Acero Electrico, The Teziutlan Copper Co., S. A. Mexico, D. F.

MICHIANA—Chairman Leslie Pugh, Casting Service Corp., LaPorte, Ind. Program Chairman R. A. Payne, The Sterling Brass Foundry, Elkhart, Ind. Director Robert H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.

Large Attendance

MID-SOUTH—Chairman Earl Kreunen, Wm. C. Ellis & Sons Co., Memphis, Tenn. Secretary-Treasurer M. B. Parker, Jr., M. B. Parker Co., Memphis, Tenn.

MO-KAN—Chairman William N. Chivvis, National Lead Co., Kansas City, Mo. Vice-Chairman Lloyd Canfield, Canfield Foundry Supplies & Equipment Co., Kansas City, Kans.

NORTHEASTERN OHIO—Chairman Stephen E. Kelly, Eberhard Mfg. Div., Eastern Malleable Iron Co., Cleveland. Program Chairman Dave Clark, The Forest City Foundries Co., Cleveland

NORTHERN CALIF.—Chairman William S. Gibbons, Ridge Foundry, San Leandro, Calif. Vice-Chairman John Bermingham, E. F. Houghton and Company, San Francisco

NO. ILL.-SO. WIS.—Chairman Chas. N. Deubner, Yates American Machine Co., Beloit, Wis.

Harry E. Gravlin, left, and Claude B. Schneible, second from left, of the Detroit Chapter, discuss the day's activities with Webb L. Kammerer, St. Louis Chapter, second from right, and F. J. Rutherford, Ontario Chapter, far right.

NORTHWESTERN PA.—Chairman Chas. F. Gottschalk, Cascade Foundry Co., Erie, Pa. Vice-Chairman Bailey D. Herrington, Hickman, Williams & Company, Erie, Pa.

ONTARIO—Chairman Alex Pirrie, Standard Sanitary & Dominion Radiator, Ltd., Toronto, Ont. Vice-Chairman F. J. Rutherford, Refractories Engineering & Supplies, Ltd., Hamilton, Ont.

OREGON—Chairman James T. Dorigan, Electric Steel Foundry, Portland, Ore. Vice-Chairman P. J. Laugen, Oregon Steel Foundry Co., Portland, Ore.

PHILADELPHIA—Chairman W. Donald Bryden, Philadelphia Bronze & Brass Corp., Philadelphia. Vice-Chairman Daniel E. Best, Bethlehem Steel Co., Bethlehem, Pa.

QUAD CITY—Chairman Eric Welander, John Deere Malleable Works, East Moline, Ill. Vice-Chairman Wm. Ellison, Thiem Products, Inc., Milwaukee

ROCHESTER—Chairman Neal F. Clement, Rochester-Erie Foundry Corp., Rochester, N. Y. Vice-Chairman Duncan M. Wilson, Engineered Castings Div., American Brake Shoe Co., Rochester, N. Y.

Saginaw Valley Chapter

SAGINAW VALLEY—Chairman F. J. McDonald, Saginaw Malleable Iron Plant, Saginaw, Mich. Vice-Chairman Woodrow Holden, Eaton Manufacturing Co., Vassar, Mich.

ST. LOUIS DISTRICT—Chairman Webb L. Kammerer, Midvale Mining & Manufacturing Co., St. Louis. Vice-Chairman Fred J. Boeneker, Bronze Alloys Co., St. Louis

SOUTHERN CALIF.—Chairman Hubert Chappie, National Supply Co., Torrance, Calif. Program Chairman Charles R. Gregg, Gregg Iron Foundry, ElMonte, Calif.

TENNESSEE—Chairman William P. Delaney, Eureka Foundry Co., Chattanooga, Tenn. Vice-Chairman Charles S. Chisolm, The Wheland Co., Chattanooga, Tenn.

J. W. Costello, right, American Hoist & Derrick Co., St. Paul, Minn., retiring chairman, Twin-City Chapter, presents gavel of chairmanship to O. J. Myers, technical director, Archer-Daniels-Midland Co., Minneapolis.

A. J. Moore, Montreal Bronze, Ltd., Montreal, Que., right, retiring chairman of the Eastern Canada Chapter, is shown presenting the gavel to the new chapter chairman, J. G. Hunt, Dominion Engineering Works, Ltd., Lachine, P. Q., Canada.

TEXAS—Vice-Chairman Edward W. Wey, Dee Brass Foundry, Inc., Houston, Texas. Secretary Elmore C. Brown, Whiting Corp., Houston

TIMBERLINE—Chairman Roger Hageboeck, Electron Corp., Littleton, Colo. Vice-Chairman E. Byron McPherson, McPherson Corp., Denver, Colo.

TOLEDO—Chairman Bernard J. Beierla, E. W. Bliss Co., Toledo, Ohio. Vice-Chairman C. E. Eggenschwiler, Bunting Brass & Bronze Co., Toledo, Ohio.

TRI-STATE—Secretary W. H. Mook, Bethlehem Supply Co., Tulsa, Okla. Vice-Chairman D. W. McArthur, Oklahoma Steel Castings Co., Inc., Tulsa, Okla.

Twin-City Chapter

TWIN CITY—Chairman O. J. Myers, Archer-Daniels-Midland Co., Minneapolis. Vice-Chairman Arthur W. Johnson, Northern Malleable Iron Co., St. Paul, Minn.

WASHINGTON—Chairman William L. Mackey, Washington Stove Works, Everett, Wash. Program Chairman William A. Shaug, South Seattle Foundry Co., Seattle, Wash.

WESTERN MICHIGAN — Vice-Chairman John A. VanHaver, Sealed Power Corp., Muskegon, Mich.

WESTERN NEW YORK—Chairman Joseph M. Clifford, Atlas Steel Casting Co., Buffalo, N. Y. Secretary A. J. Heysel, E. J. Woodison Co., Buffalo, N. Y.

WISCONSIN—Chairman A. F. Pfeiffer, Allis Chalmers Mfg. Co., Milwaukee

★ Going Strong

Active membership in American Foundrymen's Society totalled 11,151 as of June 18, 1953. This, due to the untiring effort on the part of chapter workers, exceeds the goal of 11,000 set for June 30, 1953.

The target set for June 30, 1953, at the Chapter Officers Conference is 12,000. It is felt that with the continuing effort on the part of all chapter committee men and membership workers this goal will be reached early in the year.

Effective with the coming school year of 1953-54, all AFS Student Chapter memberships will be set up to expire on the date of November 30 annually. This decision was reached after a survey of all Faculty Advisors to determine the most acceptable renewal date for student memberships.

To bring all such memberships in line with this expiration date, further invoices for student chapter dues will be prorated to the November 30 expiration date. Prorated invoices, however, will be rendered only for one of three amounts, \$1, \$2, or \$3, thus avoiding invoicing for odd amounts.

COMPANY MEMBERS

Acme Iron Works, Ltd., Saskatoon, Sask., Canada—John A. Hamilton, Pres. (British Columbia Chapter).

Barras y Perfiles, A. S., Mexico D. F., Mexico—Carlos G. Romo, Mgr. (Mexico City Chapter).

Chicago Pneumatic Tool Co., Franklin, Pa.—R. D. Carver, Fdy. Supt. (Northwestern Pennsylvania Chapter).

George C. Clark Metal Last Co., Inc., Mishawaka, Ind.—George W. Weber, Gen. Mgr. (Michiana Chapter).

Ebaloy Foundries Co., Rockford, Ill.—W. J. Flessner, Gen. Mgr. (Northern Illinois Chapter).

Indiana Steel Products Co., Valparaiso, Ind.—James A. Johnson, Fdy. Gen. Fmn. (Michiana Chapter) Conversion from Personal.

Manufacturers Brass Foundry Co., Chicago, Ill.—James T. Mikuta, Gen. Supt. (Chicago Chapter).

Casting Engineers, Inc., Chicago, Ill.—V. S. Lazzara, Pres. (Chicago Chapter).

Gartland Haswell Foundry Co., Sidney, Ohio—M. B. McKee, Pres. (Cincinnati Chapter).

H. Kramer & Co., California Div., El Segundo, Calif.—Edward Haines (Southern California Chapter).

Wisconsin Electric Power Co., Milwaukee, Wis.—Erich M. Sobota, Supv. Industl. Engr. (Wisconsin Chapter).

Metropolitan Chapter

EMIL ROGNER
Polytechnic Institute of Brooklyn

The following BIG STORY was received too late for publication in the June issue of AMERICAN FOUNDRYMAN.

The most memorable event of the past year, according to the members of the Metropolitan Chapter, occurred the night of January 5, when approximately 35 members of the newly formed AFS Student Chapter at Brooklyn Polytechnic Institute, arrived at the Essex House in Newark, N. J., to be officially installed as the first student chapter in the New York Area.

Festivities started when Metropolitan Chapter Chairman James S. Vanick, International Nickel Co., greeted the students and distinguished guests. He then turned the meeting over to Emil Rogner, chairman of the new chapter, who in turn introduced the student officers and members to the Metropolitan Chapter.

As one of the highlights of the evening, Chairman Rogner and the officers presented the new members with official AFS pins.

Prof. Midgette Introduced

Among the guests introduced by the chairman was Prof. E. L. Midgette, head of Mechanical Engineering at Brooklyn Polytech. He confirmed the increasing interest of the school in training for foundry work and the satisfaction that B. P. I. had taken the initiative in being the first school in the Metropolitan area to have a student chapter of AFS on its campus.

Professor W. H. Ruten, faculty advisor to the new chapter, urged foundrymen of the vicinity to come to the school and see what the chapter was doing and to take an interest in "these future foundrymen." Professor Ruten also urged the foundrymen to lend their support and guidance in improving the facilities and courses of the Institute.

Another distinguished guest introduced by Chairman Rogner was AFS President I. R. Wagner, who congratulated the students on their interest in the foundry industry and discussed briefly the opportunities offered to young graduate engineers.

Others introduced included National Director E. C. Troy, Philadelphia, and Past National Director F. G. Sefing, International Nickel Co., New York.

Official installation was performed by AFS Secretary Wm. W. Maloney. After praising the work of Prof. Ruten, and the members of the new chapter in the fine spirit they showed in their interest in foundry work and welcoming them into the fold of the parent organization, Secretary Maloney presented Mr. Rogner with a beautiful white box tied with baby blue ribbon. To the roar of laughter of the members present, Rogner opened the box and pulled out the famed cast iron Rattle, emblematic of all "Baby Chapters." He thanked Secretary Maloney and the Metropolitan Chapter for their support and for accepting the student chapter into AFS.

L. P. Robinson, vice-president, Archer-Daniels-Midland Co., speaker at the Twin-City Chapter meeting, explaining an important point in chicken farming.

Philadelphia Chapter

DANIEL E. BEST
Bethlehem Steel Co.

The April meeting of the Philadelphia Chapter was AFS president's night. One hundred and fifty members and guests were in attendance as I. R. Wagner, National President, re-emphasized the aims and ideals of AFS and covered in some detail many of the functions of the Society and the fine work being performed by various committees.

W. G. Parker, Elmira Foundries Div., General Electric Co. spoke on "Green Deformation in Molding Sand as an Aid to Sand Control". Charles W. Mooney, Link-Belt Co., served as technical chairman.

Mr. Parker described the deformation test in detail. He contends that the foundryman should pay more attention to deformation values and in his shop has proved its worth in reducing defects and bringing sands back in-

Above are some of the members and guests attending the Philadelphia Chapter's AFS President's Night. From left to right thy are: W. Donald Bryden, Philadelphia Bronze & Brass, Corp.; I. R. Wagner, National President, AFS; W. G. Parker, General Electric Co., Guest speaker; Wm. F. Graden, Simmonds Abrasive Co., and Charles W. Mooney, Jr., Link Belt Co., technical chairman.

to control immediately that a variation is noted. He stated that to him deformation of a molding sand determines the ease with which a pattern may be drawn from a mold and the degree of accuracy of the mold cavity.

Sand toughness number is the product of the deformation × green compression strength × 1000. Use of this product number (STN) is an indication of the workability of the sand which might be defined as the ease with which a molding sand can be formed into a mold of the required properties.

Sand toughness numbers (STN), as used in control, have their first value in simplifying the day to day operation. The second and equally valuable use of STN is the guide it affords in equipping foundrymen with a working tool to make a better selection of their materials at the sand mill.

H. E. Mandel, chairman of the educational committee, announced that the chapter had just concluded a successful two-day Dietert Sand School conducted by Frank S. Brewster, Harry W. Dietert Co., Detroit. Enrollment was 62 and attendance included members from the Metropolitan and Chesapeake Chapters.

Northwestern Pennsylvania

J. P. Finch
General Electric Co.

Northwestern Pennsylvania Chapter of the American Foundrymen's Society, sponsored a four day Foundry Sand Control School, May 18-21. Frank S. Brewster, Harry W. Dietert Co., Detroit, was in charge of the course, which consisted of 12 hours of illustrated lecture. An average of 92 men attended each session. Almost 40 per cent of these attending were from companies beyond the Erie city area. Several men attended all sessions from as far away as Pittsburgh, Pa.

Many considered the school the greatest contribution made to foundry technology by the local chapter. The course included the following subjects:

A. *Introduction;* (1) Reasons for Sand Control; (2) How Sand Control is used; (3) Some Basic Principles; (4) How Sand Control is organized.

B. *Individual Properties;* (1) Moisture; (2) Permeability; (3) Strength-Deformation-Toughness; (4) Mold Hardness-Flowability; (5) Grain Size, Clay Distribution, Density; (6) Green Core Tests; (7) Baked Core Tests; (8) Core Collapse, Hot Tear, Penetration Fins; (9) Hot Strength-Expansion, Sinter, Spall, Retained Strength; (10) Rat Tails, Scabs, Mold Atmosphere—Gas.

C. *Discussion of individual problems and examination of any castings submitted.*

Attending the May meeting of the Saginaw Valley Chapter at Frankenmuth are from left to right: Chapter Chairman Kenneth H. Priestley, Vassar Electroloy Products, Inc., principal speaker of the evening Morris Bean, Morris Bean Co., and Technical Chairman A. T. Perter, Dow Chemical Co., Detroit.

Central Indiana Chapter

William H. Faust
Electric Steel Castings Co.

Attendance by two national presidents of foundry societies; election of officers for the coming year; honoring of the chapter's past chairmen; a talk and film on *"Foundry Mechanization"*; combined to give outgoing Chairman Carl O. Schopp a busy evening at Central Indiana's last scheduled meeting for this season.

Helping to keep Central Indiana Chapter in the foreground of the American Foundrymen's Society are the two men, both past chairmen of this chapter, I. R. Wagner, Electric Steel Castings Co.; President, AFS; Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, Inc.; President, Non-Ferrous Founders' Society.

Present for the evening's activities were 140 members of the chapter, representing 30 companies. Mr. Schopp proudly noted that the chapter had exceeded its membership quota for this year and at the same time made an unofficial claim. Member for member, he said, this chapter has the best attendance per paid membership of any chapter in the AFS. "We are ready to collect the trophy should there be one," he stated.

Technical Chairman B. E. Gavin, National Malleable & Steel Castings Co., introduced the speaker, Harold C. Weimer, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, who used a film, *"Foundry Mechanization,"* to show what can be done in cost savings and increased production.

Newly elected officers for the coming year are:

Chairman: Dallas Lunsford, *Perfect Circle Corp.*
Vice-Chairman: F. E. Kurtz, *Electric Steel Castings Co.*
Secretary: J. A. Barrett, *National Malleable & Steel Castings Co.*
Treasurer: Lee Edwards, *A. P. Green Fire Brick Co.*

continued on page 93

Obituaries

R. Leslie Beattie, 62, vice president and general manager of Canadian Operations of the International Nickel Co. of Canada, died suddenly. His position embraced the management of the company's mines, mill, smelters, refineries and auxiliary operations in Canada.

Crafton M. Trasher, foundry engineer, R. Lavin and Sons, Chicago, died April 10. He was a member of American Society for Testing Materials and was on the committee on Copper and Copper Alloys and its subcommittee on Castings and Ingots for Remelting.

Albert Anderson, 90, retired foundryman and engineer for Enterprise Foundry Co., San Francisco, died May 6, in Huntington Park, Calif. He entered the industry in 1886 and helped organize Enterprise Foundry.

Edward C. Badeau, 58, in charge of special publications section of The International Nickel Co., New York, and editor of Inco Magazine, died from a heart attack May 24, at the Staten Island Hospital. He joined International Nickel in 1929, and was past president of the International Council of Industrial Editors.

Foundry Tradenews

Howard Foundry Co., Chicago, has taken over management of **Alumicast Corp.,** Chicago permanent mold foundry. The name Alumicast Corp., will be retained, and the corporation will be operated through the Howard company's general offices. In taking over management of Alumicast, Howard Foundry now makes available three casting processes – sand, precision investment and permanent mold. The company is equipped to manufacture its own dies and has its own wood and metal pattern shop.

A new stainless alloy, V2B, has been developed by **Cooper Alloy Foundry Co.,** Hillside, N. J. Combining high hardness, non-galling characteristics, and superior resistance to corrosion, the new material was developed in answer to the continued demand for a stainless steel which would not gall or seize in corrosive service.

During the recent AFS National Convention in Chicago, **Elesco Smelting Corp.** held day long shell molding demonstrations at their Lawndale Ave. plant.

Ayers Mineral Co., Zanesville, Ohio, is celebrating their 50th year of incorporation and 70th year as molding sand producers. Ayers company started operating what is said to be the first naturally bonded sand mill in the country at Zanesville in 1903.

Foundry sand freight rates, when shipped interstate in closed cars, were reduced 37 to 50 cents per ton on May 2, according to E. M. Durstine, **Keener Sand & Clay Co.,** Columbus, Ohio, traffic chairman of the **National Industrial Sand Association.**

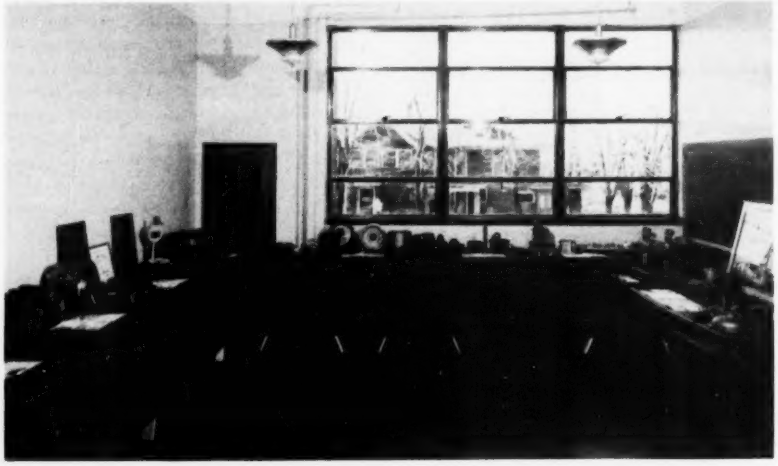
American Machine & Foundry Co., has opened a Chicago branch office at 520 N. Dearborn. The building leased by AMF will group at one address the sales offices of the greater Chicago area of a number of AMF divisions and subsidiaries. Divisions maintaining sales offices in the building are: **AMF Leland Electric Div., AMF Lowerator Sales Div., AMF Bakery Div., Wahlstrom Float-Lock Sales Div.,** and AMF subsidiaries **Pinspotters Inc., De Walt., Inc., Cleveland Welding Co., Sterling Engineering Co.,** and **Union Machinery Co.**

A newly developed process at **Electro Refractories & Abrasives Corp.,** Buffalo, N. Y., has made possible manufacture of a line of giant carbon-bonded, silicon carbide crucibles, said to be the world's largest. Previously, top capacity of Electro crucibles was 400 lbs of aluminum. Today the process enables output of king-sized pots holding as much as 1100 lbs of aluminum. Capacity is greater, of course, for heavier metals. The mammoth crucibles were developed to meet the increased sizes of furnace equipment in foundries. The new process imparts a laminated structure that increases the strength and flexibility of the crucibles.

The Annual 1952 Report of **Basic Refractories, Inc.,** Cleveland, Ohio, reviews developments behind very considerable additions to fixed assets over a seven year period. Shown in the 16-page report, which includes a gravure insert picturing and describing expanded plants and operations, is a gain of 69 percent over the 1946 sales. Pictured in the gravure insert and described in the text are Basic's two plants, the Nevada Works at Gabbs and the Ohio Works at Maple Grove.

National Tube Div., United States Steel Corp., has awarded a contract to **Wilputte Coke Oven Div., Allied Chemical & Dye Corp.,** for the design and construction of a battery of 59 Wilputte coke ovens for National's plant at Lorain, Ohio. The new ovens will have the capacity to produce approximately 290,000 tons of coke per year. It will be metallurgical coke for use as blast furnace fuel.

Cincinnati Metalcrafts, Inc. has sold the company's **Sebastian Lathe Div.** to the Sheldon Machine Co. of Chicago. All manufacturing operations will be moved to the Sheldon plant.



School Exhibits Used by Decatur

In order to promote good public relations on the community level, and to interest local youngsters in the foundry as a career, Decatur Casting Co., Decatur, Ind., recently installed a display of gray iron castings at the city high school.

Working with school officials, the company management had a foundry engineer available at the exhibit to explain the various phases of production of gray iron castings, from the sand mold to the finished product. The program was designed to fit in with that of the school's vocational guidance department, under the supervision of Hugh J. Andrews, the school principal.

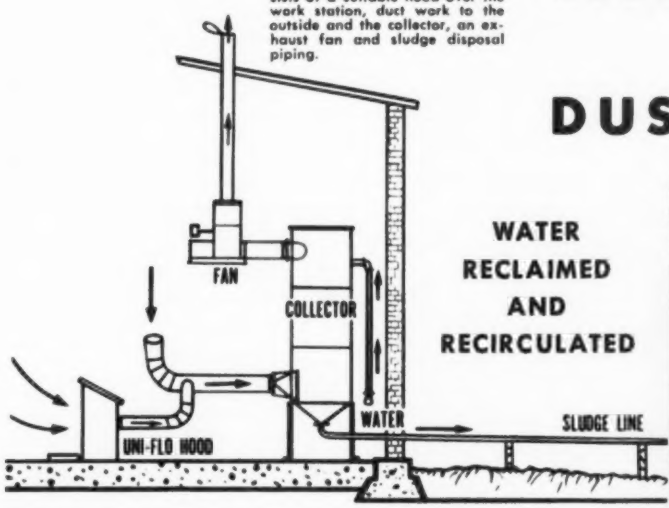
Decatur Casting Co. supplies gray iron castings to 23 companies throughout the United States and Canada, and has been producing about 190,000 castings monthly during 1953. A representative group of castings were displayed at the school, including cut-away models of finished products. Featured was a cut-away of an air compressor used on trucks to supply compressed air for the air brakes.

Exhibits of this type are of great importance in educating the public and young people in the function of the foundry and its products.

DUST IS NEVER DUST AGAIN

when it's collected with MULTI-WASH

This diagram shows the simplicity of the Multi-Wash system. It consists of a suitable hood over the work station, duct work to the outside and the collector, an exhaust fan and sludge disposal piping.



WET METHOD DUST COLLECTORS

Large concrete skimmer type tank for handling collected material from all operations in a large production foundry. Note clamshell removing dewatered residue. Water in right side is in the process of being clarified for recirculation back through the collectors.

Dust that enters a Schneible MULTI-WASH COLLECTOR ceases to be dust. It is transformed into sludge and can never again cause air pollution.

This feature alone, is one reason why so many foundries and other industries prefer the MULTI-WASH wet method system of dust control. There is no handling of dust *after* it is collected.

Dust, abrasive particles, and all smoke and fumes are efficiently removed from the air. They pass through the MULTI-WASH unit while the air is washed, not once, but many, many times. The collected particles are released in the effluent to be sluiced to a settling and dewatering tank, for clean, efficient removal. Where conditions call for fill material such sludge is dumped directly on the premises, without fear of causing any further air pollution.

If you are considering any dust control it will pay you to investigate and invest in a Schneible MULTI-WASH SYSTEM. Write direct or call your nearest Schneible representative, NOW!

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station
Detroit 2, Michigan

SCHNEIBLE

Schneible skimmer type tank installed with Multi-Wash Collectors. These tanks retain the collected material in a semi-liquid state for pumping to disposal point or process.

NEW MOVIE AVAILABLE

FOR YOUR ENTERTAINMENT: A NEW, FULL COLOR 16MM MOVIE of modern production foundry operation entitled: "THE INVISIBLE SHIELD." Available upon request. Please advise exact date you wish to show it and date you will return, so we can schedule to meet your program. *Educational and informative for groups interested in foundry work.*

Abstracts

Abstracts below have been prepared by Research Information Service of The John Crerar Library, 86 East Randolph Street, Chicago 1, Ill. For photoduplication of any of the articles abstracted below, write to Photoduplication Service at the above address, identifying articles fully, and enclosing check for prepayment. Each article of ten pages or fraction thereof is $1.40, including postage. Articles over ten pages are an additional $1.40 for each ten pages. A substantial saving is offered by purchase of coupons in advance. For a brochure describing Crerar's library research service, write to Research Information Service.

■ **A294 . . "Ductile Iron: Watch Copper Buildup," J. C. Neemes, *Iron Age*, vol. 171, no. 6, February 1953, pp. 162-164.**

Small amounts of copper have been found to increase the strength and hardness and to reduce the ductility of ductile iron in the as-cast condition. This is a distinct disadvantage in castings which must meet minimum elongation or optimum machining requirements, although it is an asset where strength and wear resistance are at a premium. Annealing is able to correct the deficiencies in ductibility, but annealing times must be correspondingly longer than for copper-free ductile iron. Copper buildup data in ductile iron are presented in tabular and graphical form.

■ **A295 . . "Tempering Burns of Light Alloy Castings During Heat Treatment," Henry Garnier, *Fonderie*, vol. 85, February 1953, pp. 3307-3312 (in French).**

Conditions which are conducive to overheating light alloy castings during tempering are discussed, along with means of prevention. Since the overheated pieces are not easily detected, failures may occur in a piece that appears to be sound. Methods of detecting defects in A-U5GT are presented, including exterior appearance (only for pieces badly burned), microscopic examination, tensile tests, and fluorescent examination. Results of sample tests are given as well as proper methods of tempering. For the case of the alloy A-U4N, the fluoroscopic method is not as reliable, tensile testing is reliable, however.

■ **A296 . . "Surface Defects on Steel Castings," D. V. Atterton, *Iron and Steel*, vol. 26, no. 3, March 1953, pp. 93-97.**

Knowledge of the various physical and chemical reactions occurring during the pouring of a steel casting has greatly increased within recent years. These reactions are discussed and utilized to show how variations in sand and metal properties may affect the incidence and severity of various surface defects on castings.

The following general suggestions for reduction of surface defects on steel castings are made: 1. Facing sands should have high fineness number. 2. Metal superheat should be as low as possible. 3. Dried sands of high clay and green moisture content are preferred. 4. Hard rammed sands should be used. 5. High pouring rates should be used.

■ **A297 . . "An Advanced Example of the Casting Art," *Metal Progress*, vol. 63, no. 2, February 1953, pp. 97-104.**

A discussion is presented of the mold construction procedure adopted by Goodyear to enable more economical and rapid manufacture of tire molds. The method adopted after many years of study and development involves the use of an elastic pattern, cast in a "core box" which is an exact replica in plaster of the finished tire. A plaster mold is then made from this elastic pattern, after which the tire mold can be cast in either iron or aluminum by conventional methods. Each of these production stages is described in some detail, and numerous illustrations clarify the various steps.

■ **A298 . . "A Method of Centrifugally Casting Titanium," O. W. Simmons, R. E. Edelman and M. Markus, *Metal Progress*, vol. 63, no. 3, March 1953, pp. 72-74.**

Titanium castings are not made at the present time because existing melting methods do not offer an uncontaminated, molten bath large enough for pouring or casting. Small castings do not have this disadvantage. An induction furnace has been built which allows small titanium articles to be centrifugally cast. Pickup from the graphite electrode is small because of the speed of the operation. Inert atmospheres are used in the furnace, whose total capacity is 3 oz.

■ **A299 . . "Contribution to the Physical-Chemical Principles of Cast Steel Pouring Techniques," W. Trommer, *Giesserei*, vol. 40, no. 3, February 1953, pp. 69-75 (in German).**

After discussing briefly the effect of metallurgical influences, of molding and pouring techniques, and of shrinkage on steel casting, the basic principles which govern the flow of steel are investigated. These are the same as for flowing water or mercury, except that steel cannot be considered an ideal fluid. The steel founder can draw important inferences from such considerations as the one that sudden changes in the direction and dimensions of the

continued on page 94

Production methods are described to Indianapolis high school students at a recent field trip by Robert Wagner, accountant for the National Malleable and Steel Castings Co. The trip was arranged through the activities of the Foundry Training Committee, a representative group of foundrymen and educators.

Chapter News

continued from page 89

High School Plant Visit

On April 7, some 250 Indianapolis industrial arts students and their instructors visited seven local foundries: International Harvester Co., C. & G. Foundry, Inter-State Foundry Co., Link-Belt Co., National Malleable & Steel Castings Co., Federal Foundry Co., and Electric Steel Castings Co. This field trip was arranged for eight Indianapolis high schools through the activities of the Foundry Training Committee, a representative group of foundrymen and educators founded in October, 1951.

The student group was divided into smaller sections allowing each one to spend time at the different foundries. This provided the industrial art students with a variety of processes and production methods to apply to their technical training.

James A. Barrett, National Malleable & Steel Castings Co., one of the foundry representatives on the Foundry Training Committee was surprised but pleased that so many of the students were interested in this field trip. Especially so, he pointed out, since tour was conducted during the school's annual spring vacation period.

Lunch Provided

Upon completion of the tour, lunch was provided for the group at the Link-Belt and National Malleable plants.

In addition to these organized field trips, the local foundry industry, through the Foundry Training Committee, has contributed funds for improving and supplementing equipment for teaching modern foundry methods in the local high schools. As a result of one of their meetings, National Malleable developed a demonstration cupola in which about 14 pounds of iron can be melted every three minutes, enough to pour 10 pounds of castings.

The success of this type of venture—bringing the practical side of view before the students—is best determined by its reception. Most enthusiastic reports were received from the principals of the high schools. W. S. Barnhart, principal of the George Washington High School, stated: "This has provided our boys with a valuable experience both in their understanding of industrial processes and in the planning of their own occupational choices."

continued on page 99

Abstracts

continued from page 92

flow of steel in gating practices are to be avoided. The influences of the various methods of melting on the properties of cast steel are tabulated and data are presented in graphical form.

▪ A300 . . "Newer Cupola Furnace Constructions, with Particular Consideration of the Hot Blast Cupola Furnace," F. Schulte, *Giesserei*, vol. 40, no. 2, January 1953, pp. 45-52 (in German).

The importance of keeping conditions in furnaces, and especially the amount of blast, constant (temperature and pressure vibrations should be taken into consideration) is emphasized. The latter can be successfully achieved only if the cross-section of the furnace does not change; i.e. the wear of the lining should be prevented by artificial cooling. Various types of recuperators are then described.

The effect of the addition of oxygen to the cold blast is briefly discussed. It appears that only a small saving in coke is achieved by this addition, while it increases the combustion temperature and carbon monoxide formation as much as does blast preheating. Combinations of cupola furnaces with low frequency furnaces enable the superheating of iron to a predetermined temperature with very little current consumption.

▪ A301 . . "Further Examples of the Formation of Gas-holes," F. Roll, *Giesserei*, vol. 40, no. 2, January 1953, pp. 53-54 (in German).

The author discussed the principles of gas-hole formation in an earlier paper (*Giesserei*, 45-52, 1950). For economical reasons it is important to recognize gas-holes as such to distinguish them from genuine shrinkage holes. The present paper shows nine further examples in diagrammatic representation and possibilities for their economical relief are discussed. The examples comprise gas-holes in cast steel, cast iron, and malleable iron.

▪ A302 . . "The Control of the Structure and of the Composition of Cast Iron by the Addition of Ferroalloys," H. P. Hughes, *La Fonderie Belge*, January 1953, pp. 1-13 (in French).

The addition to cast iron of ferroalloys, particularly those containing silicon, manganese and chromium, has proved useful in controlling the composition and structure of the cast iron for industrial purposes. Other alloys may be used but do not have the same commercial value. Micrographs show the effect of graphite on structure. Methods of addition of the alloys and the requirements of the physical form of the alloys are illustrated. The use of silicon alloys to increase the graphite content is recommended. Any sulphur present in the iron will combine with manganese, making a stronger structure and one that is less porous. A formula for computing the amount of manganese to be added for a given amount of sulphur is given.

▪ A303 . . "A Contribution to the Question of Crystallization of Cast Iron with Spheroidal Graphite," Part II, A. Wittmoser, *Giesserei*, vol. 40, no. 3, February 1953, pp. 75-84 (in German).

This second part of the paper reports on an attempt to find the answers by an indirect method to the questions: (a) Can the segregation of spherical graphite from the melt be proven? (b) Can the possibility of a supersaturation of austenite with carbon be proven?

Investigations on the dependence of the position of graphite spheres relative to the line of segregation on the decreasing carbon content (to 1.1 per cent C) seemed to support the hypothesis that spheroidal graphite is formed from mixed crystals supersaturated with carbon. The investigation of the influence of silicon content (in the region of 2.8-0.02 per cent Si) showed that perfect graphite spheres were formed even with the lowest silicon content. The study of the formation of the crystalline structure of the corresponding cooling curves of melts of eutectic cast iron with additions of magnesium showed that the addition of magnesium does not have any alloying effects, but does fundamentally change the solidification mechanism of cast iron.

▪ A304 . . "Cost Control and Cost Reduction in Foundries," Bo Casten Carlberg, *Gjuteriet*, vol. 43, no. 2, February 1953, pp. 29-37 (in Swedish).

Elementary recommendations are made on detailed computations of costs of production. It is shown that a continuous and attentive analysis of various items of cost and of their relationships can help in finding ways for reducing costs and organizing more rational production. The necessity of a close contact between the production department and the cost-computing unit, and of a constant study of the salesmen's reports by the production management is emphasized.

Book Reviews

Manufacturing Methods

Engineering Manufacturing Methods **. . by Gilbert S. Schaller. 613 pp., illustrated. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $7.00. (1953)**

Material selection and economical manufacturing methods are an increasing problem with the current trend toward specialization in engineering industry. Prof. Schaller draws on his extensive teaching and industrial experience in his text in order to "provide a survey of engineering manufacturing methods that will afford . . . insight into their potentialities." The light metals are treated in a manner commensurate with their increasing importance in engineering industry. Foundry subjects, welding, machining and other topics are covered in clear, understandable style that is highlighted with profuse illustrations.

Business Fire Insurance

What the Business Man Should Know About Fire Insurance **. . 99 pp. Published by Lloyd-Thomas Co., 4411 No. Ravenswood Ave., Chicago 40. (1952)**

This small volume has been written to acquaint the large property owner with some of the problems involved in property damage insurance. It covers insurance forms, rates, hazards, coinsurance, fire loss adjustments, valuation, depreciation, and other subjects that most business men make little effort to understand.

Material Handling

Thirty-two fundamental principles of material handling engineering are presented in booklet published by the Industry Educational Committee of the Material Handling Institute, Inc. Professors and students of material handling can obtain copies without charge.

Bureau of Standards

Annual Report 1952, National Bureau of Standards, (NBS Miscellaneous Publication 207) is available for 30 cents per copy on direct order from Government Printing Office, Washington 25, D. C.

The 89-page report summarizes scientific and engineering investigations conducted by NBS during the fiscal year 1952. Major foundry fields covered include electricity, heat and power, metallurgy, mineral products, and basic instrumentation.

Letters

continued from page 22

trated nitric acid and of aqua regia were both found to be inferior to those when using dilute nitric acid.

2. The use of a copper plate for momentary resting of the hot beaker permits almost immediate cooling in cold water of the Pyrex beaker. Economically, with Vycor at about ten times the price of Pyrex, coupled with a certain amount of inevitable breakage associated with laboratory work in general and maximum speed processes in particular, the choice favors Pyrex.

3. The further experimentation referred to have indicated a reduction of the re-solution water from 50 ml to 20 ml as satisfactory. The use of boiling water for this addition without further heating may be quite adequate but leaves us with a sort of mental hazard that bringing to the boil prevents. The net time saved by not boiling would, we believe, be very small.

The primary time-saving principles of the method are, we believe, due to the minimum quantities of liquids used and, even more specifically to the manner of use and handling of the platinum Gooch crucible.

A. E. Cartwright, *Met.*
Crane Ltd.
Montreal

AFS Headquarters Seeks Old Transactions

The national headquarters of American Foundrymen's Society has an urgent need for used volumes of the official society *Transactions.*

The years specifically sought are 1930-1952, inclusive, through Volume 60. Books must be in good condition, and will be purchased at $2.50 each.

The demand for back issues of *Transactions* results from the constantly increasing membership of the society. Copies should be mailed to Book Section, American Foundrymen's Society, 616 So. Michigan Ave., Chicago 5, Illinois.

Offer New Industrial Film

A new 16-mm, sound-color film is now available, describing equipment for material handling and processing, running approximately 22 min. The title: "Specialty: The Better Way." Prints of the film are available on free loan. Requests should be addressed to Wayne D. Adamson, Jr., Barber-Greene Co., Aurora, Ill.

Rammed Up and Poured

Bill Walkins, the foundry bard.

The Knocker

Oh, the guy I hate to mention
Is the bird who wants attention
When other business waits upon the
  shelf.
We know before he cops us
What he'll holler when he stops us,
He merely wants to talk about himself.

All his trouble with his daughter
Falling from his tongue like water
He's harassed and defeated, we must
  know.
His wife and kids mistreat him
And his customers all beat him,
The battle's hard, and all the world's
  his foe.

Oh, the murder lust comes o'er me
As I hear his sad, sad story,
For he's just himself to blame, if truth
  were known.
He's biased, egotistic,
And so antagonistic
That he won't admit a fault to be
  his own.

If he'd use his surplus energy
In working for his company,
He'd put his sales talk over with a
  bang.
For his talk's convincing—graphical,
But slightly psychopathical,
An autobiographical harangue.

From the book Rammed Up and Poured, by Bill Walkins, copyrighted by the Electric Steel Foundry Co.

Officers of Northwestern Pennsylvania Chapter are pictured at Behrend Center, Penn State College, Erie, where a film strip program entitled "A Career in Metal" was presented to F. R. Ferguson (left), administrative head of the Center. Others, from left: Fred Carlson, chairman of the chapter; Harold Werner, Behrend Center; T. E. Campbell, Behrend Center; and Bailey Herrington, chapter secretary.

Shown above are members of the Penn State Student Chapter.

Here are participants in Birmingham Chapter's Apprentice Night. From left, Warren C. Jeffries, University of Alabama; Beldon Cooper, U. S. Pipe Co.; V. I. Byford, Production Foundries; and J. L. Corley, Precision Pattern Works.

Chapter News

continued from page 93

Texas Chapter

ISRAEL SMITH
Western Foundry Co.

On May 16, the Texas Chapter held its last meeting of the year at the Glavez Hotel, Galveston. Fifty-eight members attended this meeting, the first time the chapter had held a meeting at a resort location.

Edward C. Burris, Texas Manufacturers Association, and William R. Bond, Lone Star Steel Co., Lone Star, Texas, were the guest speakers. Retiring chairman P. B. Croom was presented with a watch as a token of the esteem the chapter had for him and for his work for the chapter in the past years.

The following officers were notified of their election for the ensuing year:

Chairman: Israel Smith, *Western Foundry Co., Tyler, Texas.*
Vice-Chairman: Ed W. Wey, *Dee Brass Foundry, Houston, Texas.*
Treasurer: David K. McKie, *Tyler Pipe & Foundry Co., Tyler, Texas.*
Secretary: E. C. Brown, *Whiting Corp., Houston, Texas.*

The Texas A. & M. Committee met with College Faculty Professor Crawford and Dean Barlow and discussed the problem of mutual assistance in furthering the interest of the foundry industry at A. & M. The following recommendation was made to the Board:

That three permanent committees be formed.

The committees shall be: First, the Equipment Committee, whose duties will be to survey the present foundry setup and to make a plant layout showing the equipment required for a minimum acceptable plan, a secondary or No. 2 plan, and finally a No. 3, or ultimate objective to be desired in the plant layout.

Second, the Technical Information Committee, whose duties it will be to obtain local speakers and motion pictures, to arrange for inspection trips, and in any other way help to get technical information to the students. This committee's activities should not be confined to Texas A. & M. but should be made available to other engineering schools and sectional meetings.

Third, a Curriculum Committee, whose duties it will be to meet with the faculty and attempt to provide certain instruction material in the curriculum as can best be used to promote the knowledge and use of castings.

Detroit Chapter

WALTER P. KANTZLER
Kelsey-Hayes Wheel Co.

Approximately 80 members and guests gathered at the Detroit-Leland Hotel to hear Herbert F. Scobie, Technical Editor, American Foundryman, discuss "Foundry Progress."

Prior to the main speaker's address, various outstanding persons were introduced: Walter L. Seelbach, Past President AFS, Superior Foundry Co., Cleveland, who spoke of the 1953 convention in Chicago, and the 1954 AFS Convention in Cleveland; F. J. Walls, International Nickel Co., who spoke of F.E.F. and introduced Dr. R. A. Flinn, Jr. University of Michigan, who told of the progress in modernization of the U. of M. foundry.

Harry E. Gravlin, Jr., Ford Motor Co., then introduced Mr. Scobie. He discussed developments and progress of the foundry industry in shell molding, cupola melting, rising interest in foundry safety, hygiene and air pollution, electric furnace practice and modular iron. He went on to talk about casting design, birth of a science of solidification, core baking, pneumatic sand transportation, disposable core inserts and mechanization of small foundries.

continued on page 100

Checking notes for the Central Indiana Chapter meeting are Technical Chairman B. E. Gavin, National Malleable and Steel Castings Co., left, and speaker Harold C. Weimer, Beardsley and Piper Div., Pettibone Mulliken Corp.

Chapter News

continued from page 99

Mr. Scobie concluded by predicting more push-button operations for the future and described one now in use, producing approximately 2,000 molds per shift. Also in the future, he said, are automatic moisture and pH control of molding sand mixtures, more production and use of pearlitic malleable, high pressure molding with pressures ranging up to 1000 psi, and contour core molds (see full story on contour cores in pages 50-51).

Saginaw Valley Chapter

ROY S. DAHMER,
Eaton Manufacturing Co.

"Progress and Precision Castings" was the subject of interest at the May meeting of the Saginaw Valley Chapter at Frankenmuth. Morris Bean, Morris Bean Co., was guest speaker and was introduced by Technical Chairman A. T. Peters, Bay City Div., Dow Chemical Co.

Mr. Bean discussed several different methods of making precision castings that are being used today in both ferrous and non-ferrous foundries. He pointed out that precision castings are being produced for torque converters, jet engines, and electronic equipment which illustrates that the necessity and demand for this process has increased immensely in the last ten years. The speaker's display of precision castings as well as some slides of statuary and dimensional charts aroused much interest.

continued on page 101

Discussing notes to be presented at the past chairmen's honorary dinner given by Central Indiana Chapter are left to right: J. P. Lentz, International Harvester Co., Indianapolis; Carl O. Schopp, Link-Belt Co., Indianapolis; and Allen J. Reid, General Refractories Co., Indianapolis.

Chapter News

continued from page 100

Chapter Elections

Canton District Chapter

Chairman: Robert A. Epps, *Stoller Chemical Co., Akron, Ohio.*

Vice-Chairman: Albert S. Morgan, *Babcock & Wilcox Co., Barberton, Ohio.*

Secretary: H. S. Stoller, *Stoller Chemical Co., Akron, Ohio.*

Treasurer: Weldell W. Snodgrass, *Massillon Steel Castings Co., Massillon, Ohio.*

Southern California

President: Hubert Chappie, *National Supply Co.*

Vice-President: Charles R. Gregg, *Gregg Iron Foundry.*

Secretary: William C. Baud, *Mechanical Foundries Div. Food Machinery Co.*

Treasurer: William Mitchell, *Utility Steel Foundry.*

Albert G. Zima, International Nickel Co. presented an illustrated lecture on *"Modern Cast Irons"* during the technical portion of the meeting.

Central Ohio Chapter

Chairman: C. W. Gilchrist, *Cooper-Bessmer Corp., Mt. Vernon, Ohio.*

Vice-Chairman: Raymond M. Mayer, *Ohio Steel Fdy. Co., Springfield, Ohio.*

Secretary: N. H. Keyser, *Battelle Memorial Institute, Columbus, Ohio.*

Treasurer: Thomas M. Cusack, *Oliver Corp., Springfield, Ohio.*

Chicago Chapter

President: John A. Rassenfoss, *American Steel Foundries, East Chicago, Ind.*

Vice-President: Robert L. Doelman, *Miller and Co., Chicago.*

Secretary: William L. Rudin, *Elesco Smelting Corp., Chicago.*

Treasurer: J. T. Moore, *Wells Manufacturing Co., Skokie, Ill.*

Eastern Canada

Chairman: J. G. Hunt, *Dominion Engineering Works, Ltd., Lachine, Que.*

Vice-Chairman: C. Bourassa, *Archer-Daniels-Midland Co., (Canada) Ltd., Montreal, Que.*

Secretary; G. K. Scanlon, *Canadian Foundry Supplies & Equipment, Ltd., Montreal, Que.*

Treasurer: W. Tibbits, *Canadian Car & Foundry Co., Ltd., Montreal, Que.*

continued on page 102

Chapter News

continued from page 101

Corn Belt Chapter

Chairman: Earl White, *Paxton-Mitchell Co., Omaha, Neb.*
Vice-Chairman: Bert J. Baines, *Omaha Steel Works, Neb.*
Secretary: J. C. Henderson, *Omaha Steel Works, Omaha, Neb.*
Treasurer: George P. Herman, *Oehrle & Bergman, Omaha, Neb.*

Mexico City Chapter

Chairman: Frank Madrigal, *Fundidora de Aceros Tepeyac, S.A., Mexico, D. F., Mexico.*
Vice-Chairman: Pedor Gomez, *The Teziutlan Copper Co., S.A., Mexico D.F., Mexico.*
Secretary & Treasurer: Luis Delgado-Vega, *Cia. Proveedora de Industrias, S.A., Mexico, D. F. Mexico.*

Michiana Chapter

Chairman: Leslie Pugh, *Casting Service Corp., LaPorte, Ind.*
Vice-Chairman: Roy A. Payne, *Sterling Brass Foundry, Elkhart, Ind.*
Secretary-Treasurer: V. C. Bruce, *Frederic B. Stevens, Inc., Elkhart, Ind.*

Mid-South Chapter

Chairman: Earl Kreunen, *Memphis Casting Works, Inc., Memphis, Tenn.*
Vice-Chairman: Walter F. Tragarz, *International Harvester Co., Memphis, Tenn.*
Secretary-Treasurer: M. B. Parker, Jr., *M. B. Parker Co., Memphis, Tenn.*

Northern Illinois and Southern Wisconsin Chapter

Chairman: Charles Deubner, *Yates-American Machine Co., Beloit, Wisc.*
Vice-Chairman: William Shinn, *Gunite Foundries Corp., Rockford, Ill.*
Secretary: Martin Putz, *Mattison Machine Tool Co., Rockford, Ill.*
Treasurer: Lawrence Peterson, *Sundstrand Machine Tool Co., Rockford, Ill.*

Toledo Chapter

Chairman: Bernard J. Beierla, *E. W. Bliss Co., Toledo, Ohio.*

continued on page 104

Chapter News

continued from page 102

Vice-Chairman: Charles E. Eggenschwiller, *Bunting Brass & Bronze Co., Toledo, Ohio.*
Treasurer: Gerald J. Grott, *Unitcast Corp., Toledo, Ohio.*
Secretary: R. C. Van Hellen, *Unitcast Corp., Toledo, Ohio.*

Tri-State Chapter

Chairman: David William Harris, *Frank Wheatley Pump & Valve Mfg. Co., Tulsa, Okla.*
Vice-Chairman: D. W. McArthur, *Oklahoma Steel Castings Co., Tulsa, Okla.*
Secretary: Willis Mook, *Bethlehem Supply Co., Tulsa, Okla.*
Treasurer: R. F. Forsythe, *Big Four Foundry, Inc., Tulsa, Okla.*

Twin City Chapter

Chairman: O. Jay Myers, *Archer-Daniels-Midland Co., Minneapolis.*
Vice-Chairman: Arthur W. Johnson, *Northern Malleable Iron Co., St. Paul, Minn.*
Secretary-Treasurer: Lillian K. Polzin, *Minneapolis Chamber of Commerce, Minneapolis.*

Washington Chapter

Chairman: Wm. L. Mackey, *Washington Stove Works, Everett, Wash.*
Vice-Chairman: James N. Wessel, *Puget Sound Naval Shipyard, Bermerton, Wash.*
Secretary: Fred R. Young, *E. A. Wilcox Co., Seattle, Wash.*
Treasurer: Vernon W. Rowe: *Ballard Pattern & Brass Foundry, Seattle, Wash.*

Other Organizations

Reading Foundrymen's Association

Members of the Reading Foundrymen's Association heard a talk by Harold N. Bogart, metallurgical in the manufacturing research department of the Ford Motor Co., Detroit, at their annual dinner-meeting at the Berkshire Hotel.

Mr. Bogart talked on "Recent Developments in the Foundry Industry". He had charge of the metallurgical and production parts department of the Ford Steel Foundry during World War II.

Chapter Outings

July

11 . . Detroit
Pine Lodge Inn. Annual Outing.

17 . . Wisconsin
Maplecrest Country Club, Annual Outing and Stag.

18 . . Northwestern Pa.
Picnicana, Erie, Pa. Annual Picnic.

18 . . Chesapeake
Steamer Latrobe, Pier 7, Annual Crab Feast.

August

8 . . Canton
Alliance Country Club, Alliance, Ohio, Annual Picnic.

8 . . Chicago
Annual Stag Outing and Golf.

Student Chapter Visits Foundry

Michigan State Student Chapter had an interesting and educational visit to the Dow Chemical Foundry, Bay City, Mich. The students had an overall view of magnesium foundry practice and an example of quality control methods.

At the Annual Engineering Exposition in May the Chapter combined displays from industry with a continuous molding and pouring demonstrations in aluminum, which held the attention of many spectators. Five of the chapter's members left their books long enough to attend the AFS Convention at Chicago in May. At a recent chapter meeting they reported to the combined membership.

Newly elected officers are: Bruce Harding, chairman; Claridon Thomas, vice-chairman; Fred Hodgson, secretary-treasurer, and Thomas Thomas, corresponding secretary.

Electric Metal Makers Guild Elect Officers

At the annual meeting of the Electric Metal Makers Guild held June 4-6 at Albany, New York, the following officers were elected for the coming year:

C. H. Wyman, Burnside Steel Co., Chicago, president; W. E. Hart, Ford Motor Co., Dearborn, Mich., vice-president; and C. B. Williams, Massillon Steel Casting Co., Massillon, Ohio, secretary-treasurer.

Sand School Set For Detroit

The Harry W. Dietert Co., Detroit, will conduct a three-day sand school on August 10, 11 and 12, at the Woodward Avenue offices of Detroit Engineering Society. Expressly designed for supervisory and technical personnel of the foundry, the school does not charge for attendance.

The sand school will be patterned on the theme that foundry costs are greatly affected by the use of foundry sands. Costs are affected by sand in two mayor ways: 1) The ease with which a core maker or a molder can work a sand can be materially altered by compounding an easy-to-work sand; and, 2) The casting quality can be improved and scrap loss can be reduced by proper selection and control of sands.

Ways and means of putting these two items into practice in the foundry will be detailed by studying the sand from the fundamental viewpoint that six distinct properties are necessary: structural properties, green properties, air-set properties, dry properties, hot properties, and retained properties.

A detailed study will be made of each group of properties, giving a clear picture of the function of each as it affects the ease of working the sand in reference to manual effort and supervision required.

Sand Control

Illustrations will also be presented on control of the various properties of a sand. The effect of using various additives will receive attention.

The proper selection of the better numerical values of each essential sand property will also be studied. Emphasis will be placed on the fact that when the essential properties are carefully controlled at selected values, then a sand is produced that requires least attention and is most fool-proof.

Both motion pictures and lantern slides will be used to illustrate the lectures, which will be given by Frank S. Brewster of the Harry W. Dietert Co.

Magnesium Association members recently visited Howard Foundry Co., one of the world's largest magnesium jobbing foundries. The Howard company was host during the association's annual spring casting meeting, held in Chicago. Shown above is William Danks, chief magnesium metallurgist of Howard, pointing out some of the foundry techniques used in producing jet engine castings.

Index To

Advertisers

A.F.S. Publications

CLASSIFIED ADVERTISING

Not available for general advertising; payable with order.

UNDISPLAYED . . For Sale, Help Wanted, Personals, Engineering Service, etc., set solid . . 20c per word, 30 words ($6.00) minimum.
Positions Wanted . . 10c per word, 30 words ($3.00) minimum.
Box number address, care of publisher, should be counted as two additional lines.

DISPLAYED . . Based on per-column width, per inch . . 1-time, $15.00; 3-time, $13.50; 6-time, $12.50; 12-time, $12.00.

POSITIONS WANTED

SHELL MOLD AND INDUSTRIAL SALES EXPERIENCE—Industrial salesman with detailed technical background in shell molding. Have worked with pioneers in the field. Comprehensive patternmaking and foundry experience. Seeking sales position. For further information write **Box A7, AMERICAN FOUNDRYMAN 616 S. Michigan Ave., Chicago 5, Ill.**

METALLURGICAL ENGINEER — Aggressive, hard-hitting, metallurgical engineer-foundry specialist 11 years' experience, seeks position as liaison man, staff assistant to president of company with large foundry operations, to aid in producing high production, lower costs. 4 years chief metallurgist, national company—ferrous & non-ferrous. Mass production techniques—also shell molding. **Box A8, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

SHELL MOLDING SPECIALIST—B.S. metallurgical engineering, 1942, high honors. Resin evaluation, development of gating, patterns, equipment, production techniques, 11 years' experience—cast iron, nodular, steel, stainless, cupronickels, brasses, bronzes, aluminums. **Box A9, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

HELP WANTED

SUPERINTENDENT — Opportunity for well qualified, experienced superintendent of non-ferrous foundry employing 100-150 people. Applicant should be between 35-45. Enclose photograph and give complete record of education and experience in detail including previous employment and length of service. **Box A1, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

FOUNDRY SALES ENGINEER—Foundryman or metallurgist to demonstrate and sell foundry chemicals. Must be able to diagnose foundry problems. Age 21-35 preferred. Several territories open. **Box A2, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

FOUNDRY METALLURGIST required with experience in cast iron foundry practice. Prepared to travel. State age, experience and salary required. **Box A3, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

FOUNDRY SUPERVISORY PERSONNEL—Qualified foremen for all operations in highly mechanized, established malleable foundry. Positions open immediately. Must be familiar with progressive foundry techniques. State qualifications. Located Midwest. **Box A5, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

STEEL FOUNDRY SUPERINTENDENT for Midwest electric steel foundry producing approximately 175 tons per month of jobbing castings. Must have practical experience, especially loose pattern molding. Give full details of experience, personal information and salary expected. Replies confidential. **Box A6, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

WANTED A FOUNDRY TECHNOLOGIST, preferably with some experience in cast iron. Should be prepared to travel. State salary required and full qualifications. **Box A4, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

EXCELLENT OPENINGS IN LARGE MODERN RESEARCH LABORATORY for:

(a) Metallurgical Engineer interested in laboratory development of foundry processes, particularly gray iron. Previous foundry experience helpful but not necessary. Main requisite is interest in foundry work. (b) Physical Metallurgist. Three to five years experience with ferrous and nonferrous alloys. A broad opportunity to study current problems and to do development work on new processes. Both are permanent salaried positions.

Air Reduction Co., Inc.
Research Laboratories
Murray Hill, N. J.

FOR SALE

Jolt Pin Lift Machine

One new #812 Johnson and Jennings Jolt Pin Lift Machine. This machine is new and has never been taken out of its original skids and crate and just as received from factory. Original cost was $1650. Please make an offer to **REXITE CASTING CO., 4535 POPE AVE., ST. LOUIS, MO.**

Furnaces for Sale

Ten used Heat Treating Furnaces and two seven-ton gantry cranes. Good condition and available for immediate delivery.

Baer Steel Products, Inc.
Box 1428 Boise, Idaho

ENGINEERING SERVICE

X-Ray Inspection . . . Spectrochemical Analysis . . . Testing and Research . . . Metallurgical and Ceramic Fields. Centrally located in New England.
J. DIRATS & CO., INC.
NOTRE DAME ST., WESTFIELD, MASS.
PHONE 2260

Consulting Foundry Engineers. Modernization . . . Processing Layouts . . . Cost Reduction . . . Quality Control . . . Product-Machine Design. Architectural Design.
SESSIONS ENGINEERING CO.
Consulting Foundry Engineers
ONE N. LASALLE ST. CHICAGO 2, ILL.

EARL E. WOODLIFF,
Foundry Sand Engineer.
Consulting . . . Testing.
14611 Fenkell (5-Mile Rd.) Detroit 27, Mich.
Res. Phone Vermont 5-8724

There is no better time than now to review incentives, methods, scheduling, production control and paperwork processes.
WESTOVER ENGINEERS
Foundry Management Consultants
3110 WEST FOND DU LAC AVE.
MILWAUKEE 10, WIS.

A.F.S. Publications

	Publication Number	A.F.S. Members	Non-Members
Books			
Alloy Cast Irons Handbook (2nd Edition)	1	$2.75	$4.50
Analysis of Casting Defects	3	2.50	4.25
Copper-Base Alloys Foundry Practice	57	3.75	5.75
Cupola Operations Handbook	7	6.00	10.00
Development of Metal Castings Industry	8	3.00	6.00
Foundry Core Practice (2nd Edition)	38	6.50	10.00
Foundry Sand Handbook (6th Edition)	12	3.50	5.25
Foundry Work	50	1.76	1.76
Patternmaker's Manual	61	4.50	6.75
Recommended Practices for Sand Casting Aluminum & Magnesium Alloys	24	1.00	1.75
Symposia			
Foundry Dust Control	10	1.00	2.00
Malleable Foundry Sand and Core Practice	16	2.00	3.25
Sand Test Data for Production of Steel Castings	47	3.00	4.75
Symposium on Air Pollution	62	1.75	2.50
Symposium on Principles of Gating	56	4.00	5.75
Foundry cost booklets			
Classification of Foundry Cost Factors	6	1.00	2.00
Foundry Cost Methods	9	1.50	3.00
Recommended practices—safety and hygiene			
Fundamentals of Design, Construction and Maintenance of Exhaust Systems	19	3.00	5.00
Good Practices for Metal Cleaning Sanitation	20	1.25	2.25
Grinding, Polishing and Buffing Equipment Sanitation	22	.75	.75
Health Protection in Foundry Practice	59	3.00	4.50
Safety Practice for Protection of Workers in Foundries	21	1.25	2.25
Testing and Measuring Air Flow	26	1.00	2.00
Annual Transactions			
Volume 53—1945	30	4.00	15.00
Volume 54—1946	31	4.00	15.00
Volume 55—1947	32	4.00	15.00
Volume 57—1949	33	8.00	15.00
Index to AFS Transactions (1930-1940)	36	1.00	2.00
Education			
Apprentice Training Standards for the Foundry Industry	29	1.00	2.00
Foundry Apprentice Course Outline	39	1.00	2.00
Guide for Foremen Training Conferences	34	1.50	2.25
A. F. S. research progress reports			
Light Metals—A Study of the Principles of Gating	54	1.00	1.50
Light Metals—Principles of Gating as Applied to Sprue-Base Design	58	.50	.75
Brass and Bronze—Melt Quality and Fracture Characteristics of 85-5-5-5	55	1.00	1.50
Gray Iron—Risering of Gray Iron Castings—Report No. 1	42	1.00	2.00
Gray Iron—Risering of Gray Iron Castings—Report No. 2	43	1.00	2.00
Steel—Steel Sands at Elevated Temperatures (Tenth)	53	.40	.60
A. F. S. special publications			
Bibliography of Centrifugal Casting	35	1.50	2.25
Cupola Research Committee Reports	49	1.00	1.50
Engineering Properties of Cast Iron	46	2.25	3.50
Gating Terminology Chart (Discount on Quantity Lots)	14	.10	.25
Glossary of Foundry Terms	67	.75	1.25
Graphite Classification Chart (25 x 38 in.)	44	1.25	1.75
Pattern Standard Color Chart (Discount on Quantity Lots)	51	.10	.25
Permanent Mold Castings Bibliography	18	1.50	3.00
Recommended Names for Gates and Risers (Booklet)	65	.25	.40
Recommended Names for Gates and Risers (Chart 17 x 28 in.)	66	.25	.40
Statistical Quality Control for Foundries	63	4.50	6.75
Other publications			
Aluminum Foundry Process Control (SAE)	2	1.00	2.50
American Malleable Iron—a Handbook (MFS)	64	4.00	4.00
Cast Bronze	68	4.00	4.00
Ferrous Foundry Process Control (SAE)	11	1.50	2.50
Gates and Risers for Castings (Penton Pub. Co.)	40	6.00	6.00
Non-Ferrous Melting Practice (AIME)	41	3.00	3.50

AMERICAN FOUNDRYMEN'S SOCIETY
616 South Michigan Avenue, Chicago 5, Illinois

Please send the books circled below. $________________ remittance enclosed.

1 2 3 6 7 8 9 10 11 12 14 16 18 19 20 21 22
24 26 27 29 30 31 32 33 34 35 36 38 39 40 41 42 43
44 45 46 47 49 50 51 53 54 55 56 57 58 59 61 62 63
64 65 66 67 68

Name ____________________
Address ____________________
City ____________ Zone ________ State ________
Company ____________________

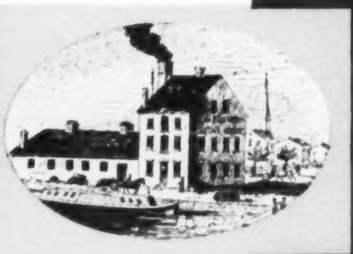
AFS pays postage when remittance accompanies order.

Please send books circled

A F S
1896

boiler cores shake out like sugar...

with LINOIL

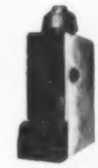


THE H. B. SMITH CO., INC., WESTFIELD, MASS., A CENTURY OLD THIS YEAR, HAS USED LINOIL EXCLUSIVELY SINCE 1929.

Boiler section castings are hoisted into free-swinging position where pneumatic vibrators loosen remaining core sand. Complete collapsibility of cores is essential for interior cleaning of sections.

Sectional view of Smith Boiler shows need for perfect cleaning inside boiler sections to give unobstructed circulation of water.

Heavy-duty twin sectional cast-iron header type boiler for industrial, commercial, and institutional applications.



Smith "Century" Special Gas Boiler for homes and small buildings.

Smith-Mills Oil Burning Boiler for homes.

Smith-Mills boiler for smaller commercial buildings.

H. B. SMITH, one of New England's pioneer foundries, mass produce quality boilers for homes, factories and public buildings.

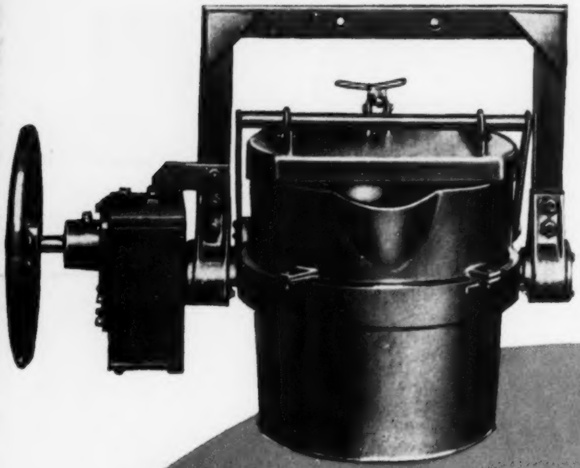
Bottlenecks are eliminated in the cleaning department because cores made with LINOIL are completely collapsible—they shake out like sugar. No sand is left inside to cause obstructions. If you are having "internal trouble" (that is, in cleaning out casting cavities) call in your ADM representative to demonstrate the collapsibility of LINOIL-mixed cores.

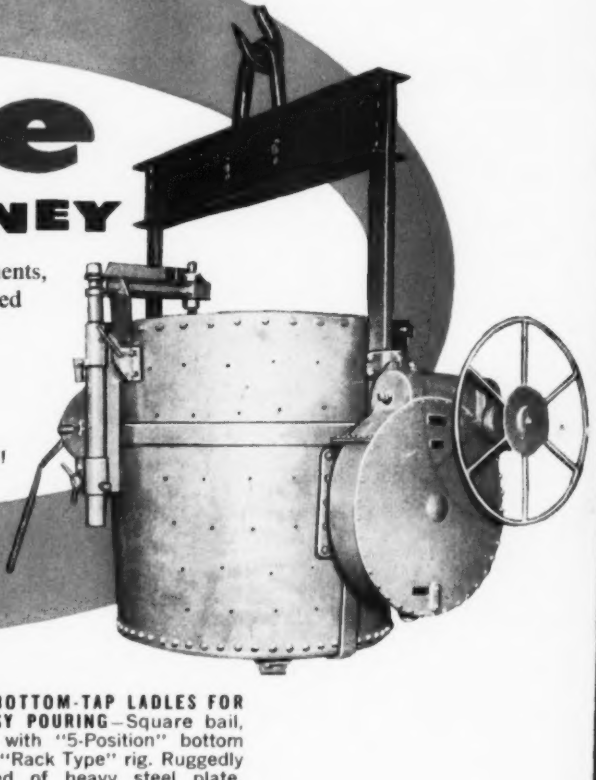
write for information on the **ADM** *line of foundry products:*

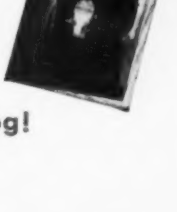
LINOIL	INDUCTOL	FRE-FLO	LIN-O-CEL
CORE OIL	FAST-BAKING CORE OIL	PARTING COMPOUND	SAND STABILIZER

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO






WHITING
LADLES